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AIRTRENDS FOR '55

Washington, D. C., Jan. 3, 1955

OUTLOOK FOR THE AIRCRAFT INDUSTRY in 1955 as seen by Aircraft Industries Association president DeWitt C. Ramsey:

Military plane output, now 900 a month, will drop to 800 a month by December of 1955.

Total military production, estimated at 10,500-10,800 units in 1954, will be somewhere between 9700 and 10,000 units in 1955.

Civil transports (325 built in 1954 including 195 36-passenger or larger types) will not equal current levels in 1955, but U. S. manufacturers have 175 airliners backlogged.

Sales volume, estimated at $8.6 billion in 1954, will taper to between $7.9 and $8.1 billion.

Twelve largest airframe producers, who recorded sales of about $5.2-$5.3 billion, will deliver goods worth $4.8 billion in 1955.

Industry employment, averaging more than 800,000 persons in 1954, is expected to average 755,000.

Output of utility airplanes (3075 units weighing 12.5 million pounds and worth about $40 million in 1954) will probably stay at about the same level for 1955.

By year's end the USAF will be more than 95% modernized with the latest type planes and equipment, the Navy air arm 80%.

GOAL OF THE USAF in early '55 is to "get moving" in production of supersonic fighters, particularly the North American F-100 which has been grounded since early November. Top Air Force officials feel slippage in the fighter field, typified by the Republic F-84F problem, was a principal factor marring the otherwise successful year in aircraft procurement and production.

PRODUCTION COST REDUCTION by the aircraft industry has been effective. Man-hours per pound of production, best yardstick for cost reductions, have been cut considerably. Better scheduling, permitting stabilized production, has been a major factor in these improvements. Other factors: competitive cost consciousness, relative freedom from technical problems, and good management.

AIR POWER WILL GET A BIGGER SHARE of the fiscal 1956 budget which should be presented to Congress in the next 10 days. Emphasis will probably be on defensive air power since strategic and tactical programs are fairly well along. FY '56 appropriations represent planes which will be coming off the production lines in fiscal years 1958 and 1959.

TWO KEY AIR FORCE COMPETITIONS, scheduled for decisions early this month, will highlight USAF developments—and perhaps spending—in '55: the long-range interceptor and the jet tanker-transport competitions. The tanker-transport competition has been one of the hottest in recent years with Boeing, Douglas, and Lockheed considered prime contenders. In the interceptor contest Northrop, Lockheed, and Republic figure prominently.

AIRTRENDS *(Continued)*

OTHER USAF PROGRAMS now in effect will remain essentially unchanged.

IN CAB EARLY 1955 WILL BE MARKED by expected White House decisions on important international route cases and by anticipated elimination of subsidy in certain overseas operations.

Later this year, the first of the major domestic route cases should be decided as the U. S. route map will get a face-lifting, the first of major scope since the immediate post World War II period.

Local service carriers will renew their fight in Congress for permanency and the recent assist given them by CAB member Adams brightens the locals' picture considerably.

TURBINE TRANSPORTS, both turboprops and turbojets, will be the center of military and civil development this year. American Airlines' decision on a four-engine turboprop to replace its twin-engine transports is as significant to the civil field as the USAF's tanker/transport decision to the military.

Airline participation in Military Air Transport Service's testing of turboprop transports is a major factor in whole future of turboprop development.

Eyes of the aviation world will be on Capital Airlines as it inaugurates service with Vickers Viscounts early this year. With 55 Viscounts scheduled for production this year, Viscounts should be flying on every continent by year's end. Lockheed deliveries in 1955 should assure Super Constellations flying on every continent except Africa by the end of the year. It will also see the Douglas DC-7B, which had its impact on domestic U. S. services in 1954, entering service on international routes.

OTHER SIGNIFICANT TRANSPORT developments in Europe:

Germany's Lufthansa airline will start passenger service within Europe in April.

Two turbine transports, SNCASE's twin-Avon Caravelle and the twin-Dart Fokker F-27 are scheduled to fly by mid-year in Continental Europe.

Vickers' 200,000-pound model 1000 jet transport should fly this year and serve as an exhibition platform for the Rolls-Royce Conway by-pass engine.

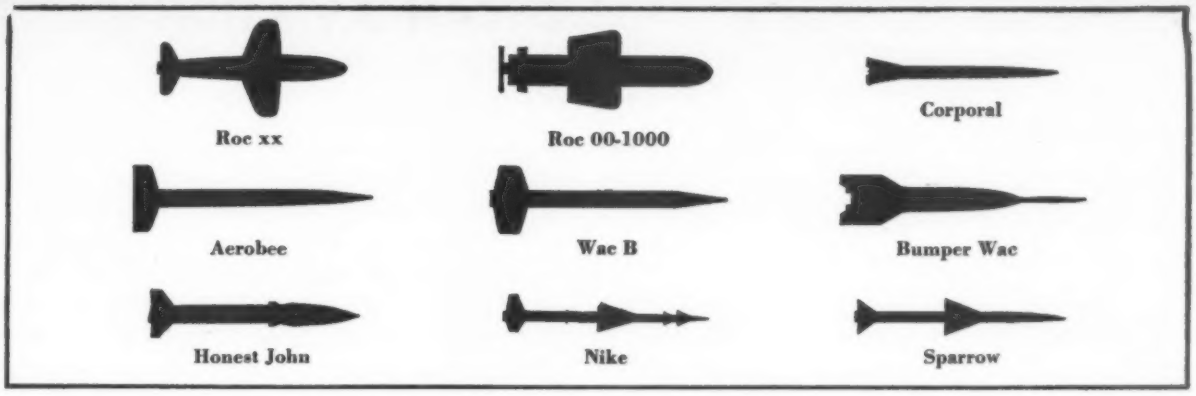
PRODUCTION OF THE THREE "V" bombers, the Valiants, Victors, and Vulcans, should increase this year but only the Valiant is apt to see RAF squadron use in '55.

In Britain's fighter field much effort will be devoted to eliminating the continuing bugs in the Hunter, Javelin, and Swift fighters.

AIRPORT DEVELOPMENTS in this country will be marked by strongest pressure yet exerted for clear-cut and immediate relief from recapture provisions.

Efforts will be directed toward getting a stronger federal aid program but such chances are slim. Thus the industry will push for release in order to attract big money from private sources.

Definite steps will be taken by Congress to rewrite the 1946 Federal Airport Act, to get out from under the $500 million obligation.



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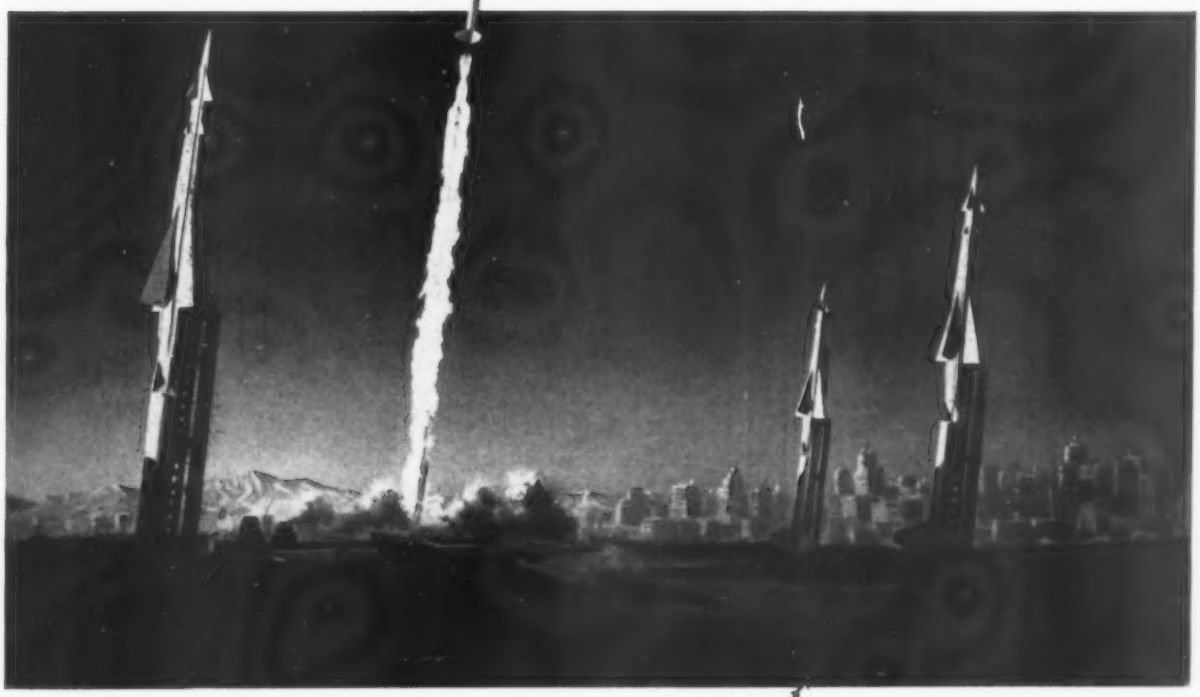
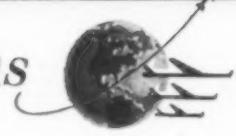
Douglas leadership in rocket airframe design has helped give us *operational* missiles in a relatively short span of time. Security cloaks even greater advances which are now on the way.



Depend on *DOUGLAS*  **First in Aviation**

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American Aviation World-Wide Directory: Twice-yearly listing of products, people, and organizations. $7.50 each. Managing Editor—Marion E. Grambow.

Official Airline Guide: Monthly publication of airline schedules and fares. $13.50 per year in USA; $14.00 in Canada; $15.00 elsewhere. Published from 139 N. Clark St., Chicago 2, Ill. Phone: Central 6-5804. Managing Editor—Robert Parrish.

Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. $175 per year. Managing Editor—Wallace I. Longstreth.

Airports: Weekly newsletter for airport officials, suppliers, and services. Airmailed every Friday. $25 per year. Managing Editor—Lois C. Philmus.

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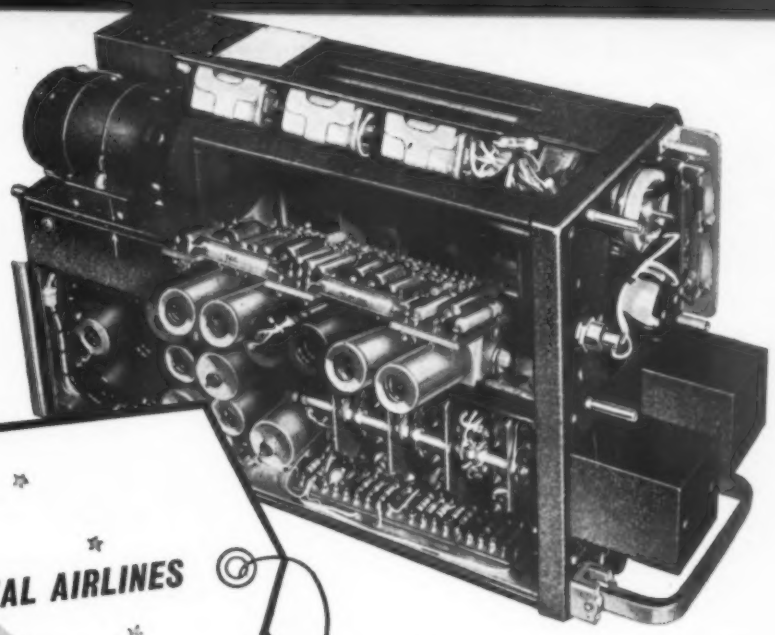

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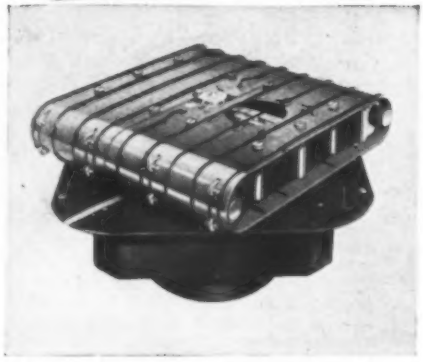

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Letters

Letters should be addressed to The Editor, AMERICAN AVIATION *Magazine, 1025 Vermont Ave., N. W., Washington 5, D. C. Anonymous letters will not be printed, but names will be withheld upon request.*

TWA and ARINC

To the Editor:

It appears to me that your article on "ARINC's reorganization" (AMERICAN AVIATION, *Dec. 6*) originated with some ARINC member or director poorly informed. In this article TWA is quoted as favoring ARINC operation on a "profit" basis. The possibility of commercial operation of ARINC, as distinguished from cooperative operation (as now), does not necessarily imply operation for profit.

We have no particularly strong ideas on the subject at the moment, and will await the long overdue analysis and recommendations of a qualified group on the subject of aeronautical communications before we take a definite position.

PAUL GOLDSBOROUGH
General Communications Manager
Trans World Airlines, Inc.

An Excellent Service

To the Editor:

Congratulations on the excellent presentation (interview with Herbert Sammons) in the Dec. 20 issue of AMERICAN AVIATION.

I feel that you have done a very good service to Napiers. However, you may find yourself involved in fierce arguments with Rolls-Royce and other engine companies I know of.

J. C. K. SHIPP
Group Aviation Representative
English Electric Co., D. Napier, and Marconi's Wireless
Washington, D. C.

Pay of the Airmen

To the Editor:

Although I do not intend to inject myself into controversies involving the size or scope of the USAF, and I appreciate the difficulties of persuading personnel from accepting discharges when due, I must take exception to the remarks of AF Secretary Harold E. Talbott pertaining to possible pay increases for USAF personnel. *(Airtrends, December 6, 1954.)*

Figures released by the Bureau of Labor Statistics show that the cost of living, as measured by the Consumer Price Index, has risen by some 93% from 1939 to 1954, and not by 200% as Secretary Talbott would have us believe. Thus, it would appear that the typical airman's salary, up 110% in the same period, has more than kept pace. Furthermore, the average earnings in manufacturing, where organized labor is strongest, have risen by about 185%, a far cry from Talbott's alleged 300% increase.

Pay increases to USAF are probably justified on the grounds that the Air Force must compete with industry for highly trained men. There is no need for the Secretary to conceal his demands behind a smoke screen of incorrect data. There is nothing improper about admitting that prices must sometimes be adjusted to meet competition. Also, there is nothing wrong about assuming that the public would like consistent, honest reasoning by its public servants.

JAMES B. JONES
Department of Economics
Dartmouth College
Hanover, New Hampshire

Books

Rules of the Air. *Edited by John Dohm. Published by Pan American Navigation Service, 12021 Ventura Blvd., North Hollywood, Calif. 185 pp. $2.00.*

A well-illustrated reference manual on rules and regulations: traffic control procedures, Civil Air Regulations, in-flight aids and services, international rules, and a section of questions designed to prime the reader for pilot examinations.

. . . WK

Canada's Flying Heritage *by Frank H. Ellis. Published by the University of Toronto Press, Toronto 5, Canada. Price $7.95. 388 pp.*

This very complete history of Canadian aviation was made possible by the sponsorship of Imperial Oil Ltd. It is a valuable work with numerous illustrations and a useful index. Since the author is an "early bird" he is able to give a particularly detailed account of the early days of flying in Canada. This is an important book for all who are connected with aviation in North America. . . . AV

The First and the Last. *By Adolf Galland; published by Henry Holt and Company, New York. 360 pages. Price $4.95.*

An account of the rise and fall of German fighter forces between 1938 and 1945, Galland's book discusses Hitler's inability to grasp the principles of defensive air power. Galland, who commanded the first German operational jet squadron at the war's end, reports that Germany could have had a fleet of more than 2500 jet fighters in 1944 if the country had not committed its best aircraft piecemeal against ground targets while Allied bombers blasted Germany. The twin-jet ME-262, with a speed of more than 500 mph, could have been in large-scale production in '44, he states.

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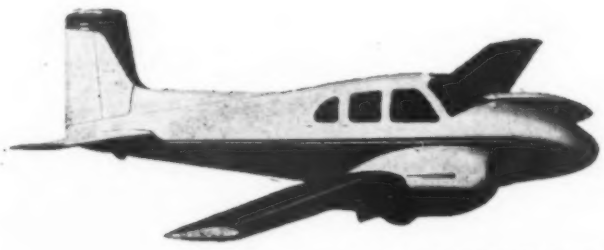

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

The author recounts the numerous delays in development and eventual small-scale production of the ME-262 despite the fact that ranking German airmen "were convinced that everything had to be done to make use of this unique opportunity." He also tells of his experiences in flying the revolutionary jet fighter against Allied bombers and interceptors.

. . . HSB

Air Navigation *by P. V. H. Weems; 4th Revised Edition. Published by Weems System of Navigation, Annapolis, Md. $6.00. 473 pp.*

New chapters on electronic navigation, pressure pattern flying, polar navigation, flight planning and cruise control, and navigation in flight combine to give the 1955 Weems edition a new book flavor. For the first time in 18 printings meteorology has been dropped as too extensive a subject for navigation text. All remaining chapters are completely revised. . . . JSM

Fluid Dynamics of Jets *by Shih-I Pai. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York. $5.00. 227 pp.*

For the scientist or engineer interested in propulsion or live testing of rockets or jets, this textbook treats the subject of fluid dynamics from the fundamentals to advanced topics such as laminar and turbulent flow of compressible fluid. . . . JSM

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When & Where

Jan. 5—Air Transport Association preface page committee mtg., 1523 L St., N. W., Washington, D. C.

Jan. 10-12—Aviation sessions, Society of Automotive Engineers annual mtg., Sheraton-Cadillac Hotel and Hotel Statler, Detroit.

Jan. 11—Meeting of Air Transport Association committee to establish procedures for agency-airline committee, Lexington Hotel, New York City.

Jan. 19-23—Miami International Aerorama, Miami International Airport, Miami, Fla.

Jan. 24—Honors Night Dinner, Institute of the Aeronautical Sciences, Hotel Sheraton-Astor, New York City.

Jan. 24-28—Twenty-third annual mtg., Institute of the Aeronautical Sciences, Hotel Sheraton-Astor, New York City.

Feb. 8-10—National Association of State Aviation Officials winter board mtg., Lafayette Hotel, Washington, D. C.

Feb. 20-22—Fourth annual Texas Agricultural Aviation Conference, A&M College of Texas, College Station, Tex.

Mar. 11—Institute of the Aeronautical Sciences national flight propulsion mtg., (restricted), Hotel Carter, Cleveland.

Mar. 28-Apr. 1—Ninth Western Metal Exposition, Pan-Pacific Auditorium, Los Angeles.

Mar. 28-Apr. 1—American Society for Metals exposition and congress (including all-day session on aircraft and rocketry sponsored by the American Welding Society), Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.

Mar. 31-Apr. 1—Symposium on Boundary Layer Effects in Aerodynamics, National Physical Laboratory, Teddington, England.

Apr. 5—International Air Transport Association technical conference, San Juan, P. R.

April 5-7—Radio Technical Commission for Aeronautics Spring Assembly Meeting, Los Angeles.

Apr. 18-21—Society of Automotive Engineers production forum and aeronautic mtg., Hotel Statler and McAlpin Hotel, New York City.

Apr. 18-21—Society of Automotive Engineers, Golden Anniversary aeronautic mtg., aeronautic product forum and aircraft engineering display, Hotel Statler and McAlpin Hotel, New York City.

Apr. 18-22—American Society of Mechanical Engineers, 75th anniversary mtg., Baltimore.

Apr. 20-22—American Rocket Society spring mtg., Baltimore.

Apr. 29—Institute of Navigation's eastern regional mtg., Friendship International Airport, Baltimore.

May 2-5—Society of Aeronautical Weight Engineers annual national conference, Hilton Hotel, Fort Worth.

May 4-6—Fourth International Aviation Trade Show, 69th Regiment Armory, New York City.

May 30-June 5—Aviation Writers Association annual convention, Montreal & Toronto.

June 21-24—Joint mtg. of the Institute of The Aeronautical Sciences and the Royal Aeronautical Society of Great Britain, IAS Building, Los Angeles.

June 23-25—Institute of Navigation annual mtg., Air University, Maxwell AFB, Ala.

Oct. 11-15—Society of Automotive Engineers aeronautic mtg., aircraft production forum, and aircraft engineering forum, Hotel Statler, Los Angeles.

Oct. 11-15—National Association of State Aviation Officials annual mtg., Baker Hotel, Dallas, Tex.

Oct. 31-Nov. 2—Society of Automotive Engineers transportation mtg., The Chase, St. Louis.

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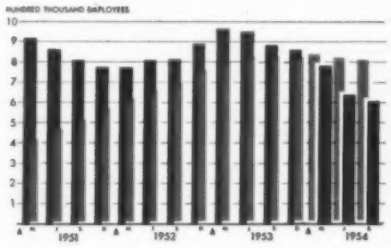
Aircraft Employment Drops Below 800,000

Aircraft industry employment began a gradual decline in 1954, and by September had fallen below 800,000 for the first time in a year. Nonetheless, the aircraft industry (red bars), remained ahead of the auto industry in employment.

For the accompanying chart, figures were obtained from the Bureau of Labor Statistics, which in June, 1953 changed bench marks. At that time, BLS reclassified certain personnel employed by automobile companies engaged in aircraft production.

The sharp decline in auto workers in September this year is largely accounted for by the interim layoff for 1955 model retooling.

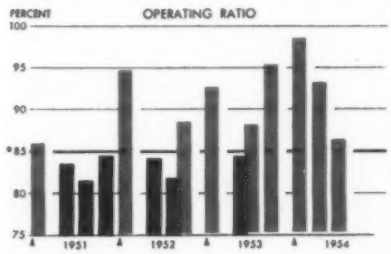


How aircraft employment trend (red bars) compares with the automobile industry.

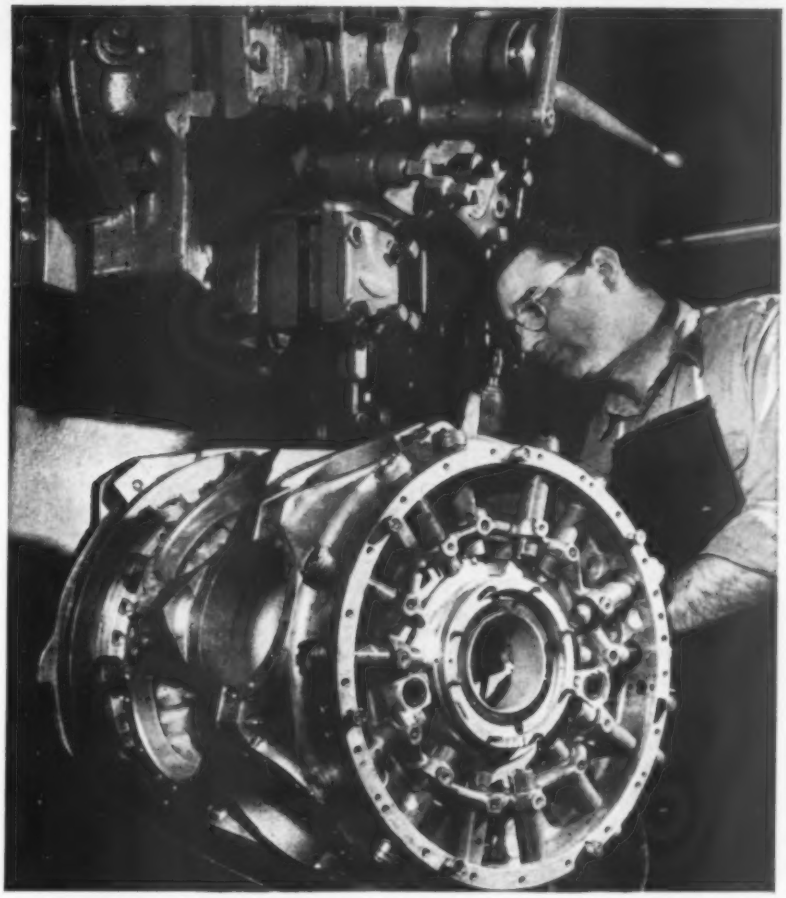
Trunks Get Close to Profitable 85% Operating Ratio

Operating ratio, the ratio of operating expense to operating income before taxes, for the domestic trunk airlines improved considerably during the third quarter of 1954. For the group the ratio comes close to the 85% figure selected by some of the carriers as a base for determining mail pay requirements.

At 85% or below (shown by black bars), the airlines are presumed to be in good shape. Above 85% (red bars), the carriers look for ways to increase revenue without increasing expense.



*Operating ratio below 85% (black bars) is best indication of a healthy situation.



Rematching a new center section to a crankcase, a highly specialized operation.

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Personal Views

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CONVAIR A DIVISION OF GENERAL DYNAMICS CORPORATION

Personal View

By WAYNE W. PARRISH

Telling the Air Force

IF THE AIR FORCE doesn't wake up soon, the Army will wind up with the job.

That was the way Jimmie Doolittle summed up the all-day Air Logistics Conference sponsored in Washington December 16 by the Air Force Association.

It was quite an extraordinary conference of over 800 leaders of industry and government. More than 200 companies were represented by one or more executives, many of them top-bracket. The Air Force Association deserves great credit for sparking the event.

There are some who may say that this was just another group of aviation people talking to themselves about aviation problems.

But it was much more than that. It was an all-out attempt to focus the attention of the Air Force on the greatest single weakness in that branch of the armed services. This weakness is the air supply line.

The theme of the conference was clear enough. The airplane is not only a weapons system in itself through the media of bombers, fighters, and missiles. It is also a medium of transportation. And the warning to the Air Force is unmistakably clear: If it doesn't take over the job of air logistics, and soon, another service, notably the Army, will come along and design and operate the logistics airplanes.

It might be said with some merit that perhaps the Air Force shouldn't attempt to become a specialist in air logistics. But the vast majority of aviation experts who know what airlift is all about believe that air logistics belongs in the Air Force and nowhere else. During the past 10 years the AF has nibbled away at the problem, at the same time stopping other services from moving ahead. But the nibbling effort isn't enough. The AF has yet to give more than lip service to this vital problem.

C. R. Smith, president of American Airlines, was particularly direct in his speech in which he pointed out the great lag in developing proper powerplants for transport airplanes. Conceding that the airlines should share in the blame, he rightly put the major fault on the Air Force, for it is the armed services, not the airlines, that have the urgent need for the best and latest airlift powerplants for whatever emergency may occur.

Now that the talks have been given and discussed by a particularly outstanding collection of experts, the question of implementation remains. Will the Air Force really do something about it? Perhaps more important, does it *really* understand what airlift is all about? And if it doesn't get jolted into action, how about promoting the Army as the focal point for air logistics? The Army, at least, is willing.

Manipulation

FOR THE PAST few years a few Wall Street manipulators with especially unsavory reputations have been playing around with a few airline stocks. Just lately there is evidence of some renewed activity. Airlines are public utilities. They provide suitable investment opportunities for the public. But there is no place for certain types of Wall Street manipulations and if some of these continue it will be up to the CAB to do a little checking.

Support Needed

A BROCHURE recently issued by the Flight Safety Foundation says "Flight Safety is the Business of Everybody." And so it is. But the subject of flight safety has never been given sufficient attention in the fast-growing and fluid aviation business.

Currently, Admiral John H. Towers (USN, Ret.), president of the Foundation, and Jerome Lederer, who has long been identified with aviation safety matters, are endeavoring to obtain more industry support. A few weeks ago Laurence S. Rockefeller, who is active in numerous aviation activities, made a substantial contribution.

We are happy to add our endorsement with the suggestion that industry provide more financial recognition of the Foundation's work.

Suggestions for Free

A FRIEND of ours passed on to us the other day a 14-carat suggestion which should please the railroads, the government, and the public. Railroad rights of way into and through metropolitan areas have great potential value. Why not erect elevated superhighways over the tracks

The hard-pressed railroads would get some much-needed economic aid, the serious traffic problem in all major cities would get a lift, and the necessity of acquiring high-priced building and residential property by cities would be alleviated. This is one way to expedite the construction of superhighways to many major airports. And in the northern cities the elevated structures would keep the railroad tracks free of ice and snow in the winter months. Makes sense to us.

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Industry Spotlight

• American Airlines is testing an experimental Rate ILS indicator designed by Westinghouse Electric Corp. The new instrument, being tested in a Douglas DC-6A, uses two vertical needles. The regular track-indicating needle is pivoted at the top of the instrument while a special "rate" indicator needle is pivoted from the base of the dial. The latter needle gives rate of closure on (or departure from) the localizer beam.

• A turbine-powered version of the Bell H-13, known as the XH-13F, has made its first flight at Bell Helicopter Corp's Fort Worth Division. The new model, according to the Air Research Development Command, is powered by a modified Turbomeca Artouste engine which is mounted directly on the fuselage separate from the transmission and rotor assemblies.

• First major break-through by British electronic producers into the U.S. airline market for airborne navigation equipment is signaled by Capital Airlines ordering of Marconi automatic direction finders in its first 40 Viscounts.

• Major contribution to Pan American's non-stop New York-London flights with the Boeing Stratocruiser was made by the international airline's "Clipper X." This is Pan Am's "paper" jet operation which is scheduled three times weekly between New York and London to gather data for future jet operations. "Clipper X" has regularly cut 5½ hours time off the piston engine transport flights.

• Size comparisons between Curtiss-Wright's YJ65-W-1, rated at 7200 pounds static thrust, and Armstrong-Siddeley's Sapphire 7 engine, latest version of the Sapphire rated at 10,200 pounds thrust, is now possible. The J65 has a diameter of 37.75 inches, length of 130.66 inches, frontal area of 7.75 square feet, and dry weight of 2595 pounds. The Sapphire 7 is 37.4 inches in diameter, 127.6 inches long, and weighs 2972 pounds.

• Allison's 3750 horsepower T-56 turboprop engine has completed its 150-hour military type test. Schedules on the T-56 are sufficiently advanced to insure a stepped-up flight schedule for the first production Lockheed C-130 at Lockheed's Marietta plant.

• Earlier German developments in the "coleopeter" field may soon come to a head. Collins Radio Co. at Cedar Rapids, Iowa, has Dr. Alexander Lippish working on a "coleopter" under an Office of Naval Research contract, according to reliable sources. Germany's Count Helmut von Zborowski claims his coleopter" has completed two years wind tunnel testing in France and can fly within two years time. These are both novel-type VTO aircraft in which the engine is surrounded by a tubular shaped wing which also houses the crew.

• Small turbojet engine being developed by General Electric for the Air Research Development Command will be an advanced type of 2000 pounds thrust. The parallel engine development by Fairchild will be a more conventional design, presumably based on the monocoque-type J44 engine. Both are being developed for use in drones and pilotless aircraft.

• Cessna Aircraft Co. has obtained a $400,000 contract to install its electric flap system on all operational L-19's, USAF liaison aircraft. Work will be done during IRAN activities at regular modification centers.

• Fairchild Aircraft Div. recently delivered its 1000th C-119 Flying Boxcar to the Air Force. Production is scheduled at least into early fiscal 1956. In addition to the 1000 C-119's, Fairchild produced 220 C-82 Packets, forerunner of the C-119.

• Although Capital Airlines' Viscounts will not initially use Skydrol, the planes are being processed for possible future use of Monsanto's fireproof hydraulic fluid. Electrical wire, for instance, will be Nylon-coated and vulnerable spots nylon painted. Later decision to use Skydrol would require replacing certain units and a shift to new seals.

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BUBBLE type canopies on fast military planes like North American's Super-Sabre had to be safely pressurized at altitudes of 8 miles or higher. Ordinary inflatable seals between the bubble and cockpit would often blow out from the effect of low pressures on the outside, high pressures on the inside.

B. F. Goodrich engineers were called in on the problem. A really effective seal, they believed, should operate with low pressure and stretch very little or not at all. Less stretch would mean less strain. They worked out a seal with a U-shaped solid rubber base. A rubberized fabric diaphragm nested inside the base simply *lifts* when inflated. (See diagram above). It works like blowing up a paper bag—low pressure gives full expansion with practically no stretch. Dangerous stretching of tube wall (like blowing up a toy balloon) is eliminated.

The new inflatable strip seal works almost instantly. Even at minus 65° it inflates with less pressure than ordinary seals needed at room temperature. There are other advantages. It resists wear and damage better than ordinary seals. It fits complex curves better. It seals and unseals faster. Sliding wear and scuffing are minimized.

The new B. F. Goodrich seal is now in use on more than a dozen makes of planes, including latest jet fighters and bombers.

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MILITARY AND INDUSTRY AGREE ON TURBOPROPS AS BEST FOR AIRLIFT

BY HARRY S. BAER, JR.

AIR FORCE ASSOCIATION's recent Air Logistics Conference, largest meeting of its kind ever held, may provide the impetus needed to speed up development of the turboprop engine for an optimum logistics transport, both industry and military observers agreed following the Dec. 16 meeting in Washington.

With top-echelon industry, airline, and AF officials presenting the principal addresses, there was commentary from many pegging the turboprop as the engine type most likely to succeed for the air logistics role. The 800 persons attending, including a number of key Congressional figures, heard the following pro-turboprop comment:

• **Air Force Secretary Harold E. Talbott**—"From all the indications I have seen, a transport with the desired range, speed, and lift that we need can probably be best developed with turboprop engines."

• **Gen. Nathan F. Twining,** AF Chief of Staff—"Our main emphasis has been on the development of turbojet engines for our combat aircraft. The combat need differs considerably from the transport need. The real difficulty is the lack of an efficient turboprop engine."

• **Donald W. Douglas, Sr.,** Douglas Aircraft Co. president—"This airplane I have taken for an example (an ideal logistic carrier of the future) would be a turboprop. It would provide the lowest possible cost for the huge day-in and day-out job of lugging freight around the world."

C. R. Smith, American Airlines president, took the middle road on turbojet in his speech. But he stressed that "we have been dilly-dallying back and forth . . . and should develop one or the other." He said such a decision should be made immediately.

In Smith's prepared text (which he did not follow too closely), he was quoted as follows:

"Some prefer the turboprop engine, others the turbojet. It should not be difficult to judge which is the better, for there is ample data on which to predicate a judgment The criteria should be the quantity of long distance transportation which the engine-airplane combination will produce."

From all indications, plus official comments by Talbott and Twining, the AF is ready to move ahead, perhaps at a rapid pace.

Noting that "the turboprop engine has not been developed as rapidly as we would like," Talbott attributed this slowness to AF priority in developing more powerful turbojet engines for combat aircraft.

"I think we should expedite the development and production of turboprop engines that will utilize the latest features of our most advanced jet engines," Talbott emphasized.

Regarding the most essential type turboprop carrier needed for a modern air logistics system, the AF secretary called for quick development of a 100,000-pound-payload transport — one which sounds much like the Douglas XC-132 currently under development.

In discussing forthcoming AF logistic transports, Talbott said "we have two long-range, heavy transports, one with 40-ton and one of 80-ton payload coming along which show great promise." In Talbott's prepared address, however, the weights referred to were printed as 25 tons and 50 tons, respectively. An AF authority, saying "Talbott must have an old script," indicated the latter figures were correct. *(Talbott's reference were to the Douglas XC-132, the 50 tonner, and the Douglas XC-133, a turboprop based somewhat on the C-124).*

TALBOTT

DOUGLAS

Head of the company that will produce the XC-132, Donald Douglas Sr., presented what he termed "hypothetical" details of the logistic carrier of the future, "which the state of the art and availability of the power plants now make it possible to design." Douglas' reference to this plane's forthcoming feasibility gives it the earmark of the XC-132, it was indicated.

Characteristics he presented included: 400,000 pounds gross weight; 100,000 pounds payload; cruising speed of about 500 mph; range of 1500 to 3500 nautical miles.

(The XC-132, according to reliable reports, will be powered initially by the Pratt & Whitney T57, turboprop adaptation of the 10,000-pound-thrust P&W J57 turbojet.)

Douglas said his "example" of an optimum turboprop transport would provide the lowest possible cost for the huge day-in and day-out job of carrying freight on a world-wide basis—about 3½ cents a ton-nautical mile.

A fleet of only nine logistic carriers of this type could do the work of 171 C-54's or 58 C-124A's, Douglas added, at a cost of from one-fourth to one-third of that needed to operate the older models, and in less than half of the time.

In his talk, Douglas also expressed optimism for nuclear-powered transports, saying "with the advent of atomic energy and its eventual application to aircraft propulsion we are likely to parallel the days of sail except that

DOUGLAS C-124B TURBOPROP

thrust will be controlled and directed at will."

The AF's responsibility to the Army and Navy in providing air logistics with appropriate transports was highlighted in one of the question and answer periods. Here, Sen. Stuart Symington (D.-Mo.), former AF secretary and one of the foremost proponents of greater air power, asked Twining if the AF could provide such airlift.

Twining referred the question to Lt. Gen. Frank Everest, Deputy Chief of Staff-Operations, who said, "We can't lift a division completely by air at the present time, as you know, but in my opinion our capacity is adequate for the strategy we now envisage."

Lt. Gen. Williston B. Palmer, Army Deputy Chief of Staff-Logistics, emphasized the imperativeness of air supply to ground forces and the Army's great interest in forthcoming air logistic advancements.

James H. Doolittle, moderator of the conference, in very strong words emphasized the AF's obligation to the Army. He said, "If the Air Force doesn't furnish airlift required by the Army, the Army should be able to furnish its own."

In summary of the conference, the following points were expressed:

(1) Air Logistics Requirement (Talbott)—The U. S. needs a modern air logistics system during peacetime and as soon as possible . . . It will not be for the AF's exclusive use, but for the other services also . . . The AF must have a supply system geared to modern warfare . . . A rapid and orderly means of requisition and control of logistics must be established . . . Surface transportation during the first 30-to-60 days of a future war cannot be relied upon . . . Military Air Transport Service is "a very fine system, strictly budgeted in terms of hours of utilization for military aircraft" . . . Combat potential of our AF can be no better than the logistics system that must support it . . . A powerplant for the ideal logistics transport has not yet been developed.

(2) Industry's Capability (Douglas)—The aircraft industry can produce the aircraft needed by the military forces . . . Economics has become a vital part of military considerations . . . It would be erroneous to evaluate the turboprop and turbojet as alternatives; both are essential to a well-rounded air logistic system . . . Organization and integration of a huge cargo transport into existing systems will not be done overnight . . . Recognition of depreciation is essential for the overall efficiency of the services' transport groups . . . Among important economies inherent to a modern air logistic concept is the reduction of the possibility of loss through theft, damage, spoilage, sabotage, or enemy action.

(3) Economic Feasibility (Dr. George T. Baker, Professor of Transportation, Harvard Business School)—Except where military reasons absolutely dictate otherwise, the logistic air transport fleet (possibly MATS) should be operated by civil air carriers, thereby stimulating international trade and freeing AF management talent for other tasks . . . Large logistic carriers operated by civil carriers probably would be cheaper for the AF and the taxpayer and conform to the administration's

Smith

Twining

policy of getting and keeping the government out of business wherever possible . . . Although tonnage that would be airlifted as a normal matter is not large in proportion to AF tonnage, it would represent some diversion of traffic from surface shipping . . . Economic advantages of an air logistic system come greatly from packaging savings and savings arising out of better inventory control, a drastic reduction of stocks at the end of the pipeline by furnishing them rapidly when, where, and as needed.

(4) Commercial Implications (Smith)—For military purposes, the transport fleet in being is obsolete . . . Transport aircraft needed by the AF for unique, uncommon missions (from airline operations) must be designed, procured, and operated by the military service . . . Reserve capacity in common-purpose aircraft must also be operated to some extent by the AF . . . Advantageous transport prices (now they are too high) will be available only with common design and quantity production. . . . There is a great opportunity for the airlines and the AF to work together in developing a suitable common-purpose transport, particularly for aircraft with payloads in the 25,000-50,000 pound area.

(5) Military Application (Twining)—Airlift is not a cure-all for any logistics problem; it is no substitute for management or sound logistic planning. . . . Immediate AF objective in airlift capacity is to increase it by 50% in the next three to five years and double or triple the present capacity in the succeeding five years. . . . There has been too much concentration on modifying existing models, rather than pursuing advanced designs that are necessary.

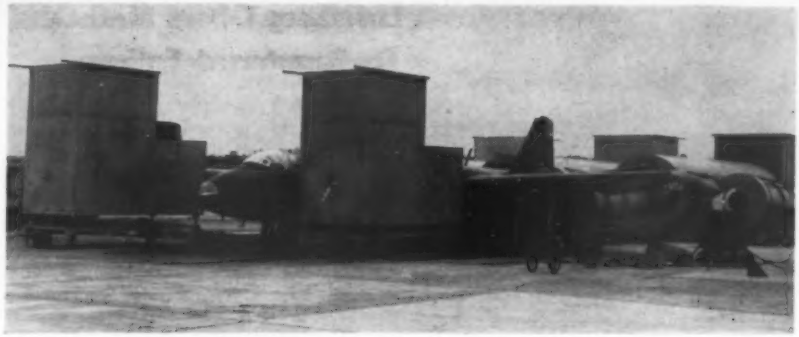
(6) International Considerations (J. Paul Barringer, Director of Transport & Communications, Department of State)—A high degree of adaptability and flexibility is needed in seeking international cooperation for a world-wide air logistics program. . . . U. S. policies for the exchange of commercial rights in international air transport provide a reasonably good base for healthy expansion of world commerce.

Speakers at the Air Logistics Conference luncheon were George C. Kenney, AFA chairman of the board, and Dr. Theodore P. Wright, Cornell University vice president.

Of the 800 persons at the meeting, more than 500 were industrial executives. And among these, were 67 presidents, 27 general managers, and seven board chairmen.

In summing up the conference, Doolittle said there is a definite need for a modern air logistics system with an additional amount of new equipment, specifically designed for the mission. He termed this "a national requirement."

ON SCHEDULE is the first U.S. Navy T-34B trainer, delivered last month by Beech Aircraft Corp. six months to the day from receipt of the order. T-34's will be primary trainers at Pensacola.



AT GLENN L. MARTIN permanent mufflers hush B-57's.

Some Answers to the Jet Noise Problem

• Nothing can be done at the source

• But control methods are bringing results

BY ROBERT M. LOEBELSON

THE PENTAGON has been fairly successful in getting the aircraft industry to make certain things very hush-hush, but in one important instance has not been able to hush things up completely. The instance—the whine and roar of the turbojet engine.

Ever since the military services started taking delivery of jet-powered aircraft almost a decade ago, they and their contractors have been confronted with the noise problem and the resulting complaints from irate citizens. These complaints, to commanders of military bases near private houses and to aircraft and engine companies, on occasion became almost as loud as the jet engine noise which prompted them. The situation is not likely to become better because more or more jets (many of them with afterburners) are to be delivered to the Navy and Air Force as the two services become more modern.

As Brig. Gen. Marvin C. Demler, assistant deputy commander of the USAF's Air Research and Development Command, put it recently, the possibility of reducing jet noise at its source "does not appear very promising." He pointed out that "As thrust increases, so does noise" and added the brightest hope for the foreseeable future is a successful community relations and public education program.

And that, in essence, is what the aircraft industry is trying to accomplish today.

Just before Thanksgiving Day, residents of Stansbury Manor, a housing development adjoining the Glenn L. Martin Co.'s airport at Middle River, Md., were awakened at 3 a.m. one morning as the two J65 engines in a Martin B-57 light jet bomber were run up.

The following morning, Martin's public relations department discovered that the most vociferous objector was a Martin engineer who lived in the development but who still insisted on his right to a full night's sleep. Martin's PR personnel, after an exchange of phone calls, succeeded to calming the engineer down and an order came from top management shortly thereafter that no engines would be run up after 8 p.m. Since that time complaints about jet noise at night (discounting those made by planes in flight) have been almost non-existent.

Noise-abatement techniques used at the Martin plant are similar to those employed to handle the problem elsewhere in the industry. Included are:

• **Orders** that when engines are to be run up for ground tests, the planes must be hooked up to mufflers.

• **Directions** that if more than two airplanes are to be run up (Martin has had two permanent mufflers fitting the B-57 engines installed), the planes are to be turned so that hangars will serve as a partial noise shield.

• **Use of special runways** where possible and a requirement that aircraft get away from residential areas as quickly as possible.

HEAD-ON view of Martin's muffler.

• **Restrictions** on flying at certain hours if possible, e.g., 2 p.m. when babies are usually napping.

• **Agreement** with letter and phone complainants that the jets are noisy, with a simultaneous attempt to point out that same noise is the "cry of security" and that the jets protect the U. S.

Martin has gone one step further than most of the other aircraft and engine companies in one respect. It is now completing a 14-minute color television film explaining the reasons for jet noise and the significance of the jet to America's security and will shortly make 50 prints available for use in all parts of the country through Modern Talking Picture Service, Inc., a free film rental organization with offices in 28 cities.

This film, *"The Intruder,"* does not play up Martin (except for the credit lines) but serves as a sort of aircraft industry-military services documentary. It was made in cooperation with the USAF and several other aircraft firms.

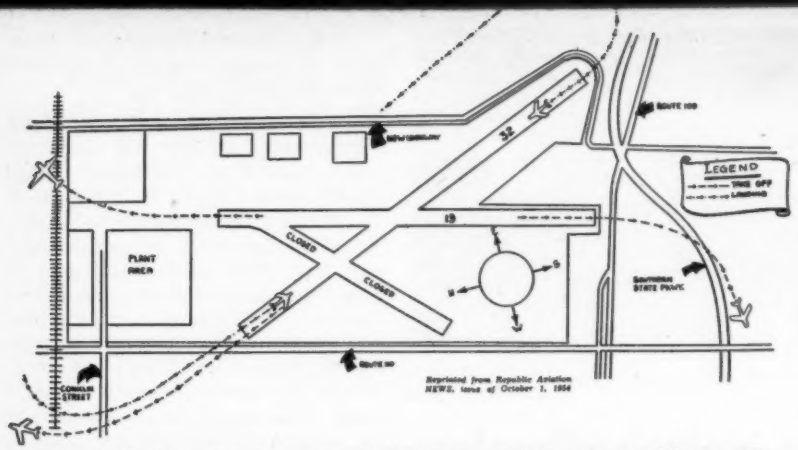
About 200 miles up the east coast is another major jet aircraft producer, Republic Aviation Corp. The F-84F builder recently took action on the jet noise problem in a slightly different way. A two-page spread in the company's house organ faced up to the fact that jet engines and airplanes are irritants but then asked the question, "What's more desirable, noise or security?"

Copies of this "noise statement," which outlined Republic's attempts to reduce noise, not only were distributed to each employee but also to Rotary, Kiwanis, and other luncheon clubs, libraries, town officials, police departments, etc., within a 15-mile radius of the Farmingdale, L. I., plant.

Republic officials admit that "We get our share of complaints," but add that they are more properly described as inquiries about what can and is being done to cut the noise level. "Each one receives the personal attention of someone in the public relations department. Each one is checked to insure its authenticity and a return phone call is made or letter written to explain the circumstances (production urgency, flyaways, weather, etc.). In 99% of the inquiries, the explanation is gratefully received."

The Farmingdale firm's policy of new flight patterns (see drawing) and engine run-up curfews is apparently starting to pay off. A recent check shows 28 inquiries in 15 weeks, a very low figure in the opinion of the USAF and independent survey teams which have studied the problem.

But Mundy I. Peale, president, and his colleagues are not content to stop there. They have just ordered a survey made by the Armour Research Founda-



REPUBLIC has taken steps to protect neighboring communities at Farmingdale. Republic and AF pilots taking off north on Runway 32 turn right to avoid Farmingdale. South of Runway 19 they turn right to avoid Amityville. Test maneuvers are begun north (over Long Island Sound) or south (over the Atlantic). Formation take-offs are banned. Approaches are made at 2,000 feet.

tion to determine what further steps could effectively be taken to cope with the even-noisier turbojets of the future.

Among jet engine builders, like Allison, Wright, Westinghouse, General Electric, and Pratt & Whitney, the situation is just about the same and is handled in a similar manner. Westinghouse's Aviation Gas Turbine Division at Kansas City has installed the latest in jet silencing equipment and is carrying out a community indoctrination program to explain the need and the reasons for the jet noise.

And on the west coast, the USAF and the aircraft industry have cooperated to alleviate the public's fears.

At Moses Lake, Wash., where residents have expressed concern over possible ill effects when the USAF starts testing the giant eight-jet Boeing B-52 bomber at Larson Air Force Base, the air base officials have scheduled a flight of a large number of jet planes over the city to simulate the sound of the B-52.

But in the Southern California area, the problem is diminishing to a point where the aircraft companies are beginning to consider their troubles as being behind them.

"In the last four months we've had only one serious complaint on engine run-ups," said Jeff O'Hern of North American Aviation, long a hot-bed of noise trouble because of its close proximity to El Segundo residential districts and its high volume of jet activity.

About the only remaining troublemakers are cranks and afterburners. Hook an afterburner on a higher-powered jet engine, like P&W's J57, and you have an ear-splitter. Even in the sound suppressors they set up vibration rumbles that make the ground shake.

North American is keeping out of noise trouble by imposing a strict curfew on its jet operations and a $2 million investment in sound abatement equipment—engine tunnels and mufflers—at its plant at the Los Angeles International Airport.

When darkness falls, North American's jets stop operating. Engine run-ups in the tunnels shut off at 10 p.m. This policy is followed by all of the manufacturers in the Southern California area.

Like North American, the El Segundo division of Douglas Aircraft Co. estimates it has the noise problem licked sufficiently to continue production testing from the Los Angeles International Airport instead of having to seek a new site away from the city. It's now putting up two airplane run-up silencers to fit its new Wright J65-powered A4D to go along with mufflers previously installed for the F4D and the A3D.

Although the Air Force's new $30 million production and testing center at Palmdale has more to justify it than its separation from crowded Los Angeles—365 flying days per year, for example—the truth is its origin lies in jet noise.

Lockheed moved its final jet line as well as its jet test flying to the Palmdale facility, thus clearing the air for an injunction suit brought by residents of Van Nuys to be removed from the calendar. Northrop has moved its jet flight test work to Palmdale, and Convair now has a facility under construction for use in connection with production flight testing of the F-102. North American also has a Palmdale flight test facility, but it is devoted to experimental and engineering flight work.

Douglas is establishing a flight test facility at the Tucson, Ariz., Municipal Airport, where production flight testing on the Long Beach division's new B and RB-66's will be performed. It recently completed a jet engine test call at Long Beach equipped with silencers to muffle the run-up noise. • • •

Lundberg Offers Method To Counteract Fatigue

Aircraft designers will probably never be able to predict the fatigue life of an individual aircraft with reasonable accuracy, says 1954 Wright Brothers Memorial lecturer Bo Lundberg. The director of Sweden's Aeronautical Research Institute anticipates that engineering problems of thermal stress and fatigue will "be with us as long as we are trying to reach still higher speeds and to build more efficient airplanes."

Lundberg proposed that effort be directed toward prevention of fatal fatigue failures down to an extremely low rate. He visualizes development of a so-called "limit fatigue life" in miles or hours flown up to a "limit probability level," with a combination of the two factors producing a failure rate of a satisfying low value that should, if possible, be agreed upon internationally. In his 141-page, freely illustrated lecture, the Swedish scientist proposed a formula for calculation of cumulative damage as one method by which the fatigue problem can be grasped and treated.

Unanimous in the praise of Lundberg's work were American Airlines' W. W. Littlewood, NACA's R. V. Rhode, and O. J. Schaefer of Glenn L. Martin. Both Littlewood and Rhode emphasized support of the multi-stress-path concept of aircraft design which Littlewood termed the almost perfect protection against fatal fatigue failures.

Better Common System Proposals Being Written

Air Coordinating Committee's Special Working Group 13 (SWG-13) has completed its study of "common system" air traffic control and navigation requirements and is now preparing its proposals for the future, according to Under Secretary of Commerce for Transportation Robert B. Murray, Jr.

Three main areas on which the group is concentrating and should complete work this month, Murray said, are:

• **Radar Integration**—Possible integration of air defense and civil radar systems to improve both peacetime and wartime traffic control.

• **Communications** — Stretching range and speed of long range aeronautical communications.

• **Traffic Control**—Development of pictorial air traffic presentations and evaluation of USAF's Volscan automatic airport approach system.

Look for More Congressional Prodding On Small Business Program

Constant Congressional pressure on the Pentagon to keep the armed services' small business programs jacked-up has never attained the desired result. One shortcoming has been the lack of adequate reporting of the number and dollar value of defense prime contracts and subcontracts awarded to small suppliers.

The Senate Small Business Committee, since its inception five years ago, has needled the Defense Department steadily. The effect was practically to force the services to get "some answers." However, the Senate group clearly does not yet feel the situation is satisfactory and will intensify its prodding in the coming year.

Indications of Pentagon activity from which improvements might evolve are being closely followed by the committee.

• **To satisfy** Congressional requirements for small business information, a program to improve the system of reporting the volume and percentage of subcontracts awarded to small business by AF prime manufacturers is now under way.

The AF will discuss this problem in a series of meetings to be held with industry. It hopes eventually to have as many as 500 AF prime producers reporting statistics on the use of outside producers or vendors in their production, according to Kennard Weddell, chief of the AF Small Business Office. In a past survey, not more than 100 reported.

"We have a very active campaign," Weddell said, "and when it is completed, it will not be just an AF project. We are confident that the Army and Navy will join with us in an overall effort to better determine what portion of the defense dollar is going to small business."

Weddell anticipates that the broader reporting procedure can begin by June 30, the end of fiscal year 1955. A meeting to discuss the plan with the AF Advisory Group on Small Business is scheduled for next month, he said.

Meanwhile, Weddell's latest surveys show that 21% of the AF dollar going to large prime contractors was passed on to small business in the form of subcontracts in fiscal 1954, approximately the same percentage as for the previous year. The fiscal 1954 estimates show $1,078,800,000 went to small business in first- and second-tier subcontracts out of $5,135,717,000 in orders received by large prime manufacturers.

Weddell's percentage figures were obtained by surveys in fiscal years 1952 and 1953 of about 100 large prime manufacturers. This report was completed in March 1953 and was based on overall figures since the start of the Korean war. Last spring a spot check with just six of the AF's very large prime producers "showed no change in pattern" and the 21% figure still existed for fiscal 1954, Weddell said.

• **For the Navy,** Cmdr. Neale W. Curtin, chief of the Navy's Small Business Section, has just completed a two-month trip to Navy prime contractors in various sections of the U. S. Purpose, he said, was to ask Navy primes to advise the Navy on their percentage and volume of subcontracts to small business. All of the figures have not yet been received, but he expects to have them early next year.

Navy contractors have no common method at present for recording their subcontracting to small business, Curtin noted, and a plan is under way to standardize this process as much as possible.

For fiscal 1954, however, Curtin said that between 21% and 22% of the large prime manufacturers' dollar went in first-tier subcontracts to small business. This was based on a sampling of less than 10 prime producers, he added.

• **For the Army,** Jack W. Askins, advisor on Army small business matters, said his calculations indicate that about 19% of the Army's money to prime contractors is subcontracted to small business. This 19% figure is based on a spot check of 28 large prime manufacturers during the first six months of fiscal 1954.

The 28 producers comprised a representative number of prime contractors from each of the Army's seven technical services, he added. These included Ordnance, Engineers, Quartermaster, Chemical, Transportation, Signal, and Surgeon General.

In this particular survey, the latest available, total Army procurement amounted to $1,582,000,000. Of this amount, $644,500,000 went to small business in prime contracts. The remaining $937,500,000 went to large prime contractors.

Of total Army procurement in this period, Army statistics show that $300,600,000, or 19%, went to small business in subcontracts, Askins said.

ATA Opposes Campaign To Extend Mail Test

Air Transport Association's board of directors is against an immediate campaign for nationwide extension of the first-class-mail-by-air experiment. The ATA board, at its mid-December meeting, decided in favor of a continuation of the Post Office's experimental program and an analysis of the results before further moves are made.

The meeting, held in Washington, also adopted a resolution approving the Army proposal for airline operation of military helicopter types on an experimental basis.

DOUBLE ENDURANCE for the Army's H-21C and AF's H-21B helicopters is obtained with two metal externally mounted fuel tanks, each with a capacity of 165 gallons. This gives a total fuel capacity of 634 gallons. Tanks can be jettisoned simultaneously.

• **Voted** an increased budget for the first half of 1955, amount of which was not divulged. Budget for last six months of 1954 was $650,000.

• **Elected** Willis Player as vice president-public relations. Player, who joined ATA on Sept. 1 as director of public relations, will be responsible for a newly approved industry public relations program.

• **Approved** a full-time secretary for the International and Facilitation committees.

Four new directors were elected and six others re-elected to the ATA board. New directors, all presidents of their respective companies, are Charles E. Beard, Braniff; G. T. Baker, National; Donald W. Nyrop, Northwest; and C. A. Myhre, Frontier. Re-elected were W. A. Patterson, United; C. R. Smith, American; J. T. Trippe, Pan American; Leslie Barnes, Allegheny; E. V. Rickenbacker, board chairman of Eastern; and Warren Lee Pierson, TWA board chairman.

LOCKHEED'S NEW RT-33 photo reconnaissance plane is shown in this first photo. Located in small, black areas on bottom and side of nose, is a battery of cameras which can photograph straight down, obliquely right or left, and directly forward. A long-range, one-seat version of the T-33, the 600-mph craft is in quantity production for MDAP countries.

PROCUREMENT NOTES

After a two-year discussion with industry, Pentagon is reported accepting the latest draft of **proposed regulations for patents and copyrights** (Section IX ASPR) and expects to take final legal step by printing them in the Federal Register during January. Disagreement between the services caused most of the delay, and agreement is now reported on the last item in dispute.

* *

Monthly meeting of the 11-man Procurement Advisory Committee held in the Pentagon Dec. 14 had on its agenda the provocative problem of **criticism by trade groups** of proposed changes in the regulations on conditions of issuing types of contracts, i.e., incentive, CPFF, price redetermination, etc.

* *

The plan to transfer **small business specialists** from the Defense Department to the Small Business Administration is again being discussed. Last fall an executive order to this effect was stopped only at the last minute by an appeal from Defense for further consideration. Proponents of the plan claim the Pentagon has a "big business stigma" and has lost the confidence of small firms.

* *

Trade associations are united in attempting to have the Pentagon change the words "close pricing" to "fair and reasonable pricing" in all contractual regulations, instructions, directives, etc. They claim this tends to cause the service negotiators to drive a hard bargain rather than give emphasis to quality of product and performance of contract.

After a hurried inspection tour of Navy bases on the West Coast, **Assistant Secretary William B. Franke,** comptroller of the Navy, immediately left for a similar tour on the Atlantic and Caribbean. His aid, Comdr. M. C. Walley, accompanied him on both trips. They will return Jan. 17.

* *

Although complete agreement has not been reached, another effort is being made by Pentagon procurement officials to submit a draft of **new cost allowance principles** to industry and the General Accounting Office within the next few weeks. These new proposed regulations are so controversial that few expect them to become official until top fiscal and procurement officials compromise their view rather than risk further delay. Pentagon officials expect the GAO to take the attitude that the new rules are too liberal. Controversial problem is whether to allow profit-sharing bonus and pension plans as items of cost.

* *

Plans for reorganization of MATS are well under way at the Pentagon (AMERICAN AVIATION, *December 20*). A top official had this to say:

"I thoroughly agree with the suggestion that MATS should adopt a corporate-type of financing and accounting. The flexibility in operation and the opportunity to adopt the best business practices would make possible greater efficiency and economy. The buyer-seller relationship would make for business-like decisions in the handling of passengers and cargo by air."

Defense May Study Air Travel Practices

An investigation of questionable bidding practices and marginal standards of service condoned by military agencies in purchasing commercial air transportation is being considered by the Defense Department. Such an inquiry was requested by the Air Transport Association.

Whether a full, official investigation will be undertaken is up to Earl B. Smith, director, Office of Transportation and Communications, whose office has an exhaustive ATA report on the subject under study.

The ATA report, understood to have been suggested originally by Defense transportation officials, covers hundreds of examples of questionable bidding practices and acceptance of substandard service. The cases cited were taken from official Army records which covered the period from Sept. 1, 1953, to April 9, 1954.

The major question raised on bidding practices, primarily, is whether or not "fake" mileages are used. Broken down by category the problems include: (1) straight live mileage bids; (2) variations in mileage figures; (3) retroactive adjustments in ferry mileages; (4) use of ferry points which have no airports; (5) changes in carriers with service completed at identical mileages and schedules bid by original carrier; and (6) outright cancelation by successful bidder when aircraft become too far out of position.

AOC Wants Aircraft Built To Fit Runways

The Airport Operators Council has recommended to CAA that aircraft designers be required to operate within the runway length criteria established in TSO-N6A, rather than constantly revise runway lengths to conform to new, heavier, more powerful aircraft. The recommendation was forwarded to CAA Administrator Fred B. Lee, along with 11 others on CAA airport standards, suggesting that CAA:

• **Undertake studies** of runway width requirements with an eye toward reducing the present 200-foot requirement to 150 feet.

• **See** if a 10- to 25-foot width reduction can be made in the 100-foot width requirement of current taxiway standards.

AOC would also like to see a review of taxiway design for high-speed turn-offs resulting in published recommendations of design data to indicate the gain in turn-off speed which various layouts would provide.

Aircraft Stocks Spurt as Year Ends

As 1954 moved into its closing weeks, airline and manufacturing stocks advanced in spurts that took most issues to new highs for the year. During the week of Dec. 5-11 all 10 airline stocks on the New York Stock Exchange and three on the American Stock Exchange registered new highs for the year.

During that week most of the manufacturing stocks slipped back, although new highs were established by Douglas, Beech, United Aircraft, and North American.

The manufacturing issues rallied, however, during the following week, and most registered gains, while Boeing joined Douglas and Beech in their advance as they set themselves new highs for the second week in a row. While these marks were being set, the airline picture turned spotty, with some prices easing off. United Air Lines moved ahead despite this, and new highs for the year were set by Capital, TWA, and Continental.

Elsewhere on the business scene:

• **North American Aviation** reports net earnings of $22.2 million for the fiscal year ended Sept. 30. Sales and other income totalled $648.8 million. During the previous year NAA had netted $12.8 million on sales of $636.5 million. Return on investment was 3.4% in 1954, up from 2% in 1953. Employment reached a 10-year-high of 54,930.

• **Braniff Airways,** during the first 11 months of 1954, netted $3.5 million after taxes in contrast to a $72,000 loss during that period in 1953. Sale of equipment accounted for $1.69 million of the 1954 net. Non-mail revenues rose $3.9 million, while mail revenues went up $1.7 million.

• **Beech Aircraft Corp.** reports a net of $3.4 million after taxes on sales of $78 million, during the fiscal year ended Sept. 30, in contrast to a net loss of $2.3 million on 1953 sales of $140.5 million.

• **Aeroquip Corp.** netted $1.1 million during the fiscal year ended Sept. 30 on sales of $19.1 million. Profits were up slightly and sales down slightly in comparison with the previous year.

• **Piper Aircraft Corp.** reports net income of close to $388,000 on sales of $11.4 million for the fiscal year ended Sept. 30. During fiscal 1953 net was over $351,000 on sales of $12.7 million.

DIVIDENDS

• **Braniff Airways** paid a 50¢ per share dividend on Dec. 30 to stock of record Dec. 23.

• **Continental Air Lines** paid a 12½¢ dividend Dec. 31 to stock of record Dec. 17.

• **Trans Caribbean Airways, Inc.,** will pay a stock dividend of 5% to Class A & B shares, plus a quarterly 5¢ dividend, on Jan. 15.

CONTRACTS

• **USAF** expects to farm out more than half its maintenance and modification work during 1955 in comparison with this year's 41%, according to Budget Bureau director R. R. Hughes.

• **Shell Oil Co.** has been awarded a four-year contract to supply the kerosene-type fuel for Capital Airlines' fleet of Vickers Viscounts. Fuel will correspond to the British DERD 2482 type.

• **Pratt & Whitney** has received a $2 million contract for research and development from the Navy. Nature of the project was not disclosed.

• **Beech Aircraft Corp.** will build an additional $6 million worth of portable ground generator power units (MD-3) for the USAF, extending current production at least into early 1956.

• **Curtiss-Wright Corp.** will build a simulator for Pan American's Douglas DC-7C's. The carrier has used a C-W Stratocruiser simulator since 1948.

• **Edo Corp.,** Long Island, N. Y., which participated in the development of hydroskis, has received a $2.5 million contract from the Navy for research and development work of an unspecified nature.

• **Pastushin Aviation Corp.** has received a $3 million contract from the USAF's Air Materiel Command for North American F-86F pylon fuel tank kits.

• **Southern California Aircraft Corp.,** Ontario, Calif., will next year carry out maintenance and overhaul on approximately 300 USAF North American T-28 trainers, under terms of a contract for over $1.5 million.

• **AiResearch Aviation Service Co.** will equip 12 USAF Convair 340's with executive interiors, seating 23 passengers, between now and July.

FACILITIES

• **Westinghouse Electric Corp.** plans to spend more than $12.5 million on new jet engine research shops and laboratories in Kansas City.

• **Ford Aircraft Engine Division,** Chicago, plans to add four new jet test cells by August, at a cost of over $1.5 million. Plant now has six.

GENERAL

• **Bell Aircraft Corp.** has acquired Hydraulic Research and Manufacturing Co., Burbank, Calif., through an exchange of stock. The latter firm, which makes lightweight hydraulic valves, becomes the fifth Bell wholly owned subsidiary.

• **Hoffman Radio Corp.** has changed its name to Hoffman Electronics Corp. The firm's subsidiary, Hoffman Laboratories, is active in airborne electronics.

• **Fairchild Engine & Airplane Corp.** has purchased the military business of Kendall Controls Corp., Waltham, Mass., pneumatic valve and control manufacturer.

• **Hydro-Aire, Inc.,** has set up a new electronics division which will specialize in transistors.

• **Planning Research Corp.** for aviation and related studies, has been formed in Los Angeles by a group of engineers and researchers, mainly from the Rand Corp. • • •

NORTH AMERICAN AIRLINES, Inc., inaugurated its first non-stop Los Angeles-New York aircoach service Dec. 18 on this DC-6B. The company purchased these airplanes from Douglas for $1,300,000 each, the first such purchase of new equipment by a non-scheduled carrier.

BELL 47J — QUICK CHANGE ARTIST

5-MINUTE change to ambulance use begins with door removal.

Upholstery and carpeting slip out, seat frame folds away.

Custom interior features fold-away desk for executive use.

• Executive • Cargo

• Rescue • Ambulance

THE NEW Bell Model 47J four-place utility helicopter, scheduled for 1955 production, is well on its way to being "all things to all people." It can be used for executive travel, cargo carrying, rescue, and ambulance service, with adjustments that can be made in minutes.

As an executive aircraft, it features custom interior with room for the pilot and two passengers. Easy floor and seat removal makes room for the cargo floor. In ambulance service, the complete litter kit can be installed for two patients in about five minutes and from there hoist gear turns the rotorcraft into a rescue vehicle within six minutes.

Few tools are needed for conversions because of the wide use of "pip" pins. A fold-away desk for the executive user is an extra added attraction.

Litter rack and attendant's jump seat (facing litters) go in.

Conversion to internal hoist configuration in six minutes.

Six "pip" pins secure litter door to complete conversion.

One or two men can be hoisted at same time by electric power.

Long-range fuel kit consists of 52-gallon rubber barrel.

Two litters can be carried with attendant and pilot.

CRASHPROOF FUEL TANKS

- **New cells survive test impact without puncture**
- **CAA development could reduce crash fire hazard**

TEST STRUCTURE simulates wing of Boeing transport.

EVER SINCE experiments with bullet-sealing tanks during World War I, aviation has searched for safer means of carrying fuel. First came simple metal cans, then gunk applied to structural sections to produce "integral" tanks, then lightweight rubberized cells.

The fourth major step has now been taken: a rubber-and-nylon cell has been developed which will survive certain types of crashes unpunctured. If test results are borne out in use, the death toll from fire after survivable crashes may be cut to a new low.

The "crashproof" tank has been developed by CAA with the cooperation of the Goodyear Tire and Rubber Co. and the U. S. Rubber Co. Since 1949, CAA's Technical Development and Evaluation Center in Indianapolis, Ind., has been working on the problem of finding a suitable material and design (AMERICAN AVIATION, *June 8, 1953*).

By June of this year the first stage in the program will have been completed: data will be made available to the industry on what material should be used for a given amount of crash protection. TDEC will then move on to tackle the second half of the job: discovering means of making the fittings of the tank—fuel filler caps, sump pumps, etc—as crashworthy as the tank itself.

Last month TDEC demonstrated the methods by which the new tank was developed. As members of the CAA, the rubber companies, and the press watched, a tank inside a simulated wing section was mounted on a 300-foot Navy catapult. With 180 gallons of water inside as its fuel load, the tank was fired down the track at 70 mph. As it approached the end of the track, the car upon which the tank was riding was slowed to a stop, and the tank hurtled through the air to strike a sandbagged backstop. Examination of the crumpled wing section showed that the only leakage from the tank came from a hole drilled in the filler cap as part of the instrumentation.

Preliminary rupture tests on over 50 different materials consisted of exposing sample disks to blasts of compressed air. From these tests the four most likely materials were selected for catapult testing. Each type was tested in four different weights: 0.15, 0.30, 0.45, and 0.60 pounds per square foot. One of the earliest tanks, made of heavy 0.60 psf material, resisted impact loads of 180 g's.

The new tanks are designed to withstand only moderate crashes, since the object of the program was to save lives by preventing fire. In severe crashes, where the occupants of the plane would be killed by the impact, the condition of the fuel tanks was felt to be immaterial. In CAA's words: "The fuel cell must be able to contain fuel under any imposed load up to a maximum of that necessary to tear the wing from the fuselage."

Since present rubberized fuel cells weigh about 0.15 psf or less, there will be a weight penalty connected with the new tanks. It is estimated that in the case of a two-engine transport this might amount to about 175 pounds, with an average material weight of 0.39 psf.

This weight penalty might be reduced by using heavier material on the front and bottom of the cell and lighter sheets on the top and rear walls.

The rubber companies have made no concerted effort to sell the tanks as yet because of the lack of test results. When these are available, some time this spring, a more vigorous sales campaign is expected. Inquiries are already reported from two major transport manufacturers, a lightplane builder, and the Army, with reference to use of the tanks in helicopters. Once the crashproof fuel tanks have been shown to be practicable, a major military market is seen in trainers and transports.

Fitting manufacturers are optimistic about their ability to produce fittings which will be light, fuel-tight, and capable of disconnecting under predetermined loads and a variety of directions of movement.

AT LEFT: Looking down the 300-foot test catapult. Center: Simulated wing section leaves catapult at 70 mph. Right: The impact. Result is shown below.

WRECKED, but not leaking.

MOHAWK LIKES HELICOPTERS

• Local service line sees bright future for rotors after three-month experiment

THE LOCAL SERVICE carriers, with their short stage-lengths and relatively small passenger loads, seem to some observers to be the best potential market for commercial helicopters. This summer the first local carrier took the plunge as Mohawk Airlines began operating passenger service between New York City and Liberty/Monticello, 82 miles away in the Catskill Mountain resort area.

The service ran three months—June 7 to Labor Day. Last month, with the figures tallied up and the Sikorsky S-55 busy on trips for Santa Claus and other charter customers, Mohawk summed up its experience.

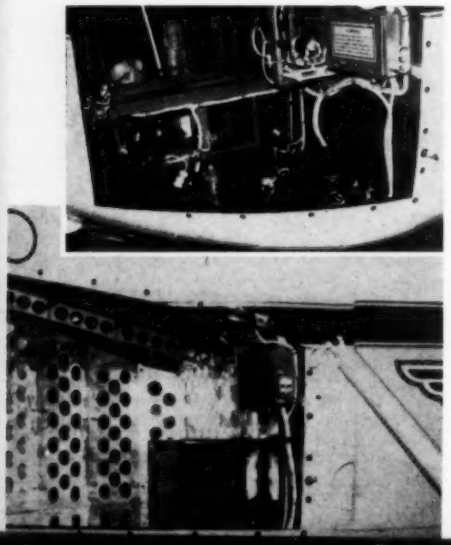
• **Had it lost** any faith in the helicopter's future with local service? *Not a bit.*

• **When** would that future arrive? *"Well, it has always been two years away," observed Carl Benscoter, v.p.-operations, "and it still looks that way."*

In trying to bring that future closer, Mohawk faced the problem of stripping a rotorcraft built on a military production line down to where it could haul eight passengers between Newark Airport and Liberty (*see box*). "We attained this aim," says Benscoter, "and were able to operate to this maximum on several occasions. We hope that our future operation of this aircraft will allow carriage of eight passengers with more regularity."

The regularity of such full loads was noticeably lacking this summer. Average load factor for the period was 25.83%. Among the other statistics:

ELECTRICAL AND RADIO compartment (inset) before converting into baggage compartment (below).



IN SCHEDULED OPERATIONS

Hours flown:	198
Passengers:	341
Miles:	18,591
Passenger-miles:	31,372
Daily utilization (hrs.):	2.52

COSTS

(Based on scheduled operations plus charters, etc.)

	Per Hour	Per Mile
Flying operations:	$ 30.01	39.46¢
Direct maintenance, flight equipment (including labor, materials, and reserve for overhaul of components):	$ 43.18	56.78¢
Depreciation, flight equipment (4 years for aircraft, 3 years for engines):	$ 45.22	59.46¢
Total Direct Operating Cost	$118.41	155.70¢

Maintenance when component overhaul reserve accounts were excluded totaled $11.37 and 5.65 man-hours per flight-hour.

Maintenance costs for Mohawk's single S-55 were higher than they would have been for a fleet operation, since about 25% of the work was done on overtime by mechanics who had been busy during regular hours working on the carrier's DC-3's. Two mechanics were added to the staff at Newark for such work, but at major inspection periods the workload was too heavy for them, and additional men had to be flown 200 miles from the carrier's home base at Ithaca, N.Y. The Number Three (90-hour) check required 106 man-hours, and only one day each week (*Tuesday*) was set aside for maintenance.

PASSENGER CABIN. Note radio equipment under seat.

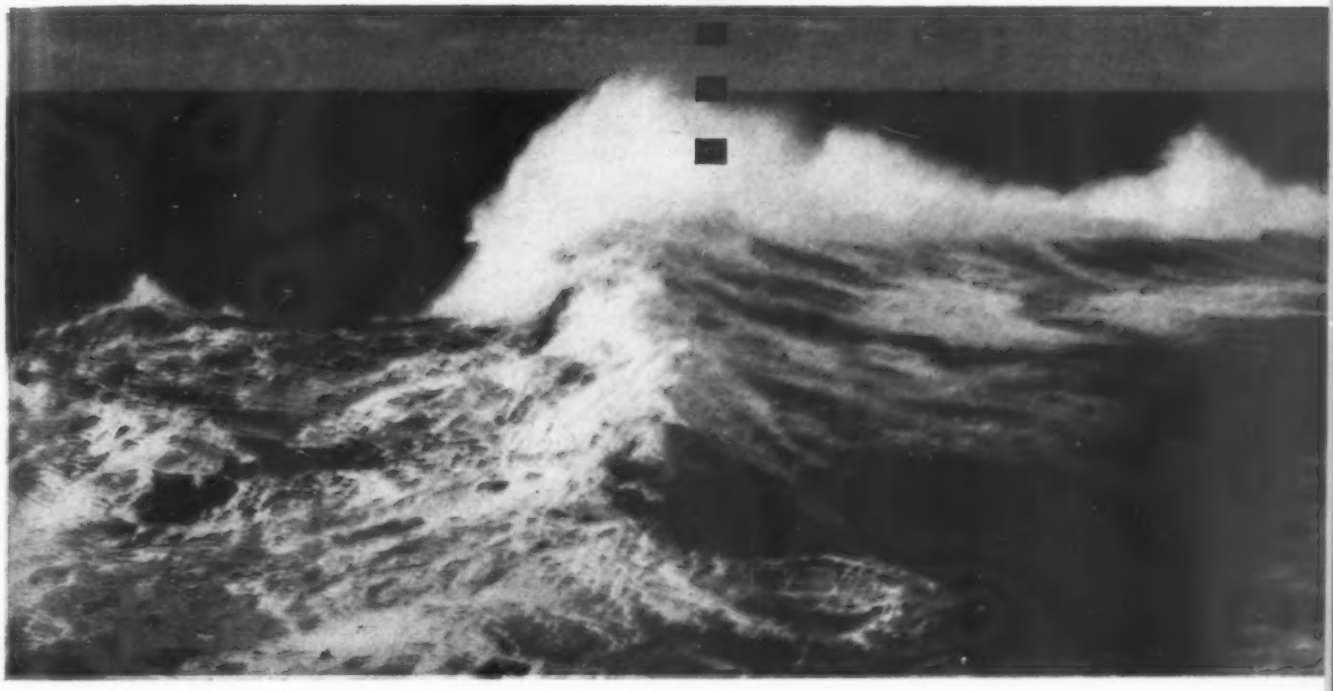
Maintenance costs and other expenses were not, however, the prime difficulty. The main problem was getting passengers. The tariff when the

HOW MOHAWK PRODUCED THE LIGHTEST S-55 IN OPERATION

Three tentative plans for paring pounds, plus the actual result, are shown below.

Items	Plan 1 Feb. 10, 1954	Plan 2 Feb. 20	Plan 3 Mar. 10	Actual Result May 17, After Weighing
Gross weight	7200#	7200#	7200#	7200#
Empty weight	4785#	4785#	4785#	4777#
Additional Equipment:				
8 passenger seats & belts @ 15#	120#	120#	100#	
Dual instruments	4	....	4	
Night & instrument flight	15	....	....	
Landing lights	12	....	....	
Anti-coning restrainers	7	....	....	
Aircraft radio	40	30	40	
ATC installation	....	20	32	
Soundproofing, upholstery & rug	91	140	120	
Total equipment weight	289#	310#	296#	
Total empty weight	5074#	5095#	5081#	
Equipment Removed:				
Cabin heater (less ducts)	....	75#	30#	
Inverters (+5# pump +5# inverter)	....	36	26	
24-amp. battery	....	27	27	
Rear fuel tanks	....	....	16	
Weight of equipment removed	0#	138#	99#	
Net empty weight	5074#	4957#	4982#	5073#
Disposable weight	2126#	2243#	2218#	2127#
Crew & Fuel:				
Pilot	170#	170#	170#	190#
Residual fuel & oil	52	52	32	48
Lubricating oil, 8 gallons @ 7.6#/gal.	61	61	61	60
Fuel (column 4 = 50 gallons) @ 6# gal.	360	375	375	306
Total crew & fuel	643#	658#	638#	604#
Net payload	1483#	1585#	1580#	1523#
8 passengers & bags (@ 165# + 20#)	1480#	1480#	1480#	1480#

TOP SECRET



You see here the next great area in the rocketing progress of flight...a study in deep blue of three-fourths of our world.

To those behind the scenes, the picture says this:

Today at Martin, one of the most important airplanes in the world is about to be officially unveiled. It is the United States Navy's great new XP6M—ship No. 1 and prototype of an entirely new concept in air power, which may well launch a new era in American security and supremacy in the air.

For the rivers, lakes, and seas of the world offer countless free and indestructible bases for the swift deployment of troops, armament and materiel... "bases unlimited," within sight from the air of virtually every spot on this earth!

The Martin XP6M is a water-based aircraft, powered for unbelievable speed, and a basic design adaptable to a variety of top-priority functions.

Its name, appropriately, is The SeaMaster. Its dominion: three-fourths of our world.

MARTIN

BALTIMORE · MARYLAND

service started was $18.00 plus tax, one way, a rate of 19.56¢ per mile. At the time this was the lowest passenger helicopter fare in the U.S., and Mohawk knew it would have to carry a full load every trip to break even.

• **Passengers** were not impressed, however, by the bargain, especially since they could fly to other Mohawk points at 8.5¢ per mile in DC-3's. When Mohawk cut the fare to $12.95, or 14¢ per mile, passenger volume nearly tripled within a week.

• **A second factor** in the problem of generating business was the location of departures. With a 30-mph headwind the trip from Newark to the Catskills took 85 minutes. From some parts of New York City, the passenger could spend that long getting to Newark Airport.

"It is our opinion," Dave Postle, Mohawk's director of research, says, "that had we been able to utilize a heliport on Manhattan Island, our passenger traffic would have been at least three times our experienced volume."

Studies for such a heliport are now being conducted by the Port of New York Authority, but no firm date has been announced when one may be available. Meanwhile Mohawk is going ahead with plans to start training more helicopter pilots this spring, hoping that it will be able to fill its eight seats by the time summer reaches the Catskills.

New Offer by Eastern For Colonial

Colonial Airlines continued to figure prominently in year-end news as: (1) Eastern Air Lines made a new offer to acquire CAI's assets and (2) U. S. District Court, New York City, set March 1, 1955, as the date for trial in the government's 3-year-old suit against Colonial and its former president, Sigmund Janas, Sr.

The Eastern offer came midway in CAB hearings to determine if Eastern previously gained illegal control of Colonial. It was made at the invitation of Colonial for new merger offers. Eastern said it would trade one share of its stock (value about $37.75) for two shares of Colonial (value about $33), or, in effect, give about $9.7 million for CAI's 515,600 shares of outstanding stock.

National Airlines, also invited to bid, declined with this wire from NAL president G. T. Baker: "PURSUANT TO THE INVITATION . . . THIS IS TO ADVISE THAT NATIONAL AIRLINES WILL NOT SUBMIT A BID IN COMPETITION WITH EASTERN AIR LINES WHICH IS, IN EFFECT, TO BE ACCEPTED OR REJECTED BY EASTERN, UNTIL THE PENDING ENFORCEMENT HEARING AND INVESTIGATION INSTITUTED BY THE CAB TO DETERMINE WHETHER OR NOT EASTERN STILL HAS ILLEGAL CONTROL OF COLONIAL IN VIOLATION OF THE CIVIL AERONAUTICS ACT HAS BEEN ADJUDICATED."

Colonial took the Eastern offer under consideration and promised a decision prior to Jan. 31, 1955.

The court suit, meanwhile, dates back to July 1951 and the CAB investigation that led to Janas' ouster as CAI president because of alleged violations of federal statutes. Following settlement of the CAB case, the board filed criminal informations with the U. S. Attorney, but the case has been virtually dormant until last month.

Then Assistant U. S. Attorney Peter Brown, CAB compliance **chief Robert** L. Griffith, and compliance attorneys Frank Oelschlager and John F. Wright, activated the proceedings through petitions for early court hearings. On Dec. 14, Judge Gregory Nonan fixed March 1, 1955 as the date for trial in which Colonial and Janas are faced with violations for which maximum fines total $800,000.

MAN ON THE COVER:

Douglas Campbell of Panagra

Douglas Campbell, vice president and general manager of Pan American Grace Airways, is one of the aviation industry's leading international figures. In addition to a background in South America, the area served by Panagra's 10,438 route-miles, which dates back to 1921, he has been active in the international organizations which laid the groundwork for the present-day boom in international air travel.

Following graduation from Harvard in 1917 Campbell enlisted in the American Expeditionary Forces, trained as a pilot, and commanded the 94th Pursuit Squadron—the first flying unit in the AEF. After becoming a leading American ace, he returned to this country to help in pilot training.

He joined W. R. Grace & Co. in 1921, serving in various capacities in that company's sugar properties in Peru. As manager of these activities he directed some 2500 people prior to returning to the company's New York offices in 1932 where he became active in Panagra. Typical of his work was the surveying of the airline's inland route expansion in Colombia.

By 1935 he was made assistant treasurer of Panagra and in 1939 transferred from W. R. Grace & Co. to Lima as vice president in charge of Panagra in South America. During two years in this position he spearheaded the company's route extension and stepped-up service associated with elimination of German lines of Panagra territory.

Transferred to New York in 1941, Campbell directed equipment policies, personnel expansion, operation of Panagra's Air Transport Command activities, and other administrative and operational functions. He has travelled extensively and for extended periods throughout all of South America.

He was appointed to his present position as vice president and general manager of Panagra in 1948.

MANUFACTURING BRIEFS

New chairman of the Aircraft Industries Assn. Helicopter Council is **Stanley Hiller, Jr.,** president of Hiller Helicopters. He succeeds **C. H. Kaman,** president of Kaman Aircraft . . . Keynotes of the spring assembly of the **Radio Technical Commission for Aeronautics** (Apr. 5-7) will be electronics reliability airframe electronics, and helicopter electronics . . . An advanced DC-7 or Super Connie powered by derated Wright T49 turboprops (10,000 hp rated) would cruise at 500 mph and bring in an annual profit of $1.4 million, says **Roy T. Hurley,** president of Curtiss-Wright. The estimate was on the basis of 60% power permitting two transcontinental or transoceanic flights daily.

Jet engine test cell for high-temperature components has been put into operation by **Ryan Aeronautical Co.** It can handle ratings up to 35,000 pounds thrust . . . **Lockheed** has received another order for P2V Neptunes from the Navy, the 24th such order since production began in 1944. Work schedules now reach into late 1956 . . . Flight tests have been completed by **Douglas Aircraft** on the A3D-1 twin-jet bomber powered by P&W J57 engines. Earlier version flew in Sept., 1953, with Westinghouse J40's.

A symposium on jet engine fuels and 15 other technical papers are scheduled for presentation at the annual meeting of the **Society of Automotive Engineers,** Jan. 10-14 . . . Predictions on the future of the turboprop, made 18 months ago to the USAF in the Rand report, have been proved accurate, according to a former Rand official.

BOUNDARY LAYER CONTROL

• Europe's foremost exponent sounds off

BY JAMES HAY STEVENS

LONDON—Dr. Ing. G. V. Lachmann, Director of Research at Handley Page and noted for his pioneer work in boundary layer control, believes there is too much talk of supersonic speeds today and that the time has come for military and civil airplanes to diverge.

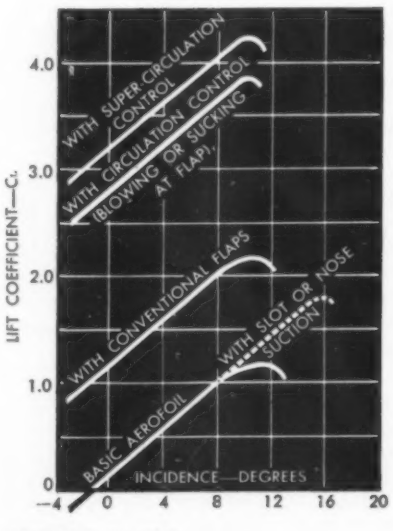
"Too many of the younger generation are in love with linearized theory and want to go faster and faster when, in fact, we are only now really beginning to get the most out of subsonic aerodynamics," Lachmann told AMERICAN AVIATION.

"Many designers are still only too ready to make airplanes by putting motors in gliders and to accept turbulence as inevitable," Lachmann added. "The time has come for the powerplant to become an integral part of the airplane and to contribute to the efficiency of the whole by assisting circulation control as well as by providing thrust."

In a recent lecture before the Royal Aeronautical Society here, Dr. Lachmann surveyed present knowledge of the boundary layer and methods for its control. He cited two distinct results to be obtained from boundary layer control—*high lift* and *laminarization*.

1. High Lift. High lift can be generated by blowing or sucking air from slots in conjunction with nose and trailing-edge flaps. This application can be thought of as an aero-mechanical development of the slat and slotted flap. With slots, the injection of air from the higher underwing pressure area into the boundary layer over the upper surface re-energizes it and retards separation, so that the stall is delayed. Higher angles of attack can be used and greater lift developed. This "natural" circulation control is limited by the kinetic energy available from the pressure drop between the lower and the upper surfaces of the airfoil. *(See Chart 1)*

CHART 1



Next logical step is to use pumps to blow out air tangentially to the upper wing surface.

An alternative is to achieve the same result by removing the turbulent boundary layer before it can separate. This is done by sucking through a porous skin or spanwise slots—the latter usually being at points of suction peak, such as the leading edge of the main flaps or the junction of nose flap and main wing.

In general, suction requires a smaller mass flow, but ejection is simpler to install—particularly when adapting an existing airplane, since the slot is very narrow and runs conveniently along a wing joint at, or near, the spar. Ejection, on the other hand, has the effect of increasing lift because the jet of air off the flap trailing edge increases the effective chord.

• **In this field** of boundary layer control intense practical application is needed right away. It presents great opportunities in halting the increase in stalling speeds which has beset aviation.

Relatively little work on full scale has been done in Europe, Lachmann pointed out, since wartime German experiments *(notably by Arado)*. In the U. S. the CAA has sponsored the application of the Arado "suck-and-blow" system to a Cessna 170 with remarkable results. Even more impressive is the work of John Attinello, whose ejection flap, fitted to a Grumman Panther, reduces take-off speed by 20 knots or permits an extra 3000 pound load.

A fundamentally important feature mentioned by pilots of the Panther is that the ejection flap gives improved control right down to the stall, making it possible to use the extra speed range to the full.

Summing up, Lachmann emphasized these points:

• **Landing and take-off** runs can be reduced to 500 feet over a 50-foot screen.

Suction flap on inboard portion of wing is feature of Arado system.

• **All swept-wing** airplanes (including supersonic) would gain a higher lift co-efficient and improved low-speed control because suction or ejection reduces the adverse effect of spanwise flow.

• **To get best results,** airplanes should be designed, not adapted, to sucking or blowing, and powerplants should be integrated with the design.

• **The wind tunnel** period has passed and the time has come for full-scale experiment and engineering development of the "plumbing."

2. Laminarization. Drag reduction by maintaining laminar flow in the boundary layer is also at the point where engineering problems are superseding aerodynamic research. Basically there are two methods:

• **The near ideal** of distributed suction through a porous skin.

• **Removal** of boundary layer air through strategically placed spanwise slots.

Both methods present practical problems. A porous skin is difficult to devise and suction through it results in a complete loss of dynamic pressure. Slots, too, are difficult to make, since the tolerances on their width are very close and the lip contour must be maintained in service. Lachmann introduced a compromise by applying suction through discrete strips or sinks. These spanwise slots can be covered either with porous or perforated material.

• **The laminar boundary** layer has a range between the thickness (or thinness) at which transition to turbulence will take place due to surface roughness and that at which it will occur from instability. Sufficient suction is required to maintain the "crest" of the layer below the instability thickness and yet not so close that an impossibly high surface finish is needed. Several experimenters have shown that the laminar boundary layer needs to be about twice the thickness of any surface

blemish or dust speck to prevent transition.

Chart 2 shows how the discrete sinks maintain the boundary layer within a practical stable range. The effects of over and under sucking are also shown. The closer the strips, the less suction is required for stability and the less the reduction in boundary layer thickness—so the surface need be less smooth. In fact, current laminar-flow airfoil finish, ± 0.003 inch on the 3-inch gauge, is satisfactory.

• **Lachmann drew attention** in his lecture to the fact that flight experimenters have generally been more optimistic about laminarization than have wind tunnel researchers who have thought that an impossible standard of surface finish would be imposed. He attributes this to the misleading effect of comparison by the chord Reynolds number, which only gives true dynamic similarity where the ratio of surface roughness to wing chord is the same for models and full scale.

Lachmann explains that with his wing having suction from discrete strips, the dynamic similarity can be established from the Reynolds number per foot-run, so favoring high altitude. He shows that any required chord Reynolds number can be met by choosing the appropriate strip spacing, and that any size airfoil can be treated by adding more strips at *equal* spacing.

The effect of this is to allow an increase of speed with altitude. For instance, a wing that can be laminarized up to 200 fps at sea level, could reach 800 fps at 45,000 feet. In practice this makes laminarization possible under cruising conditions up to the onset of compressibility.

• **The nose** of the airfoil, for 5 to 7%, is most critical for roughness, for here the boundary layer is thin. The practise is to cover this area with some light, easily removed material up to 15,000 feet to protect it from flies, grit, etc. This area, which is laminar because

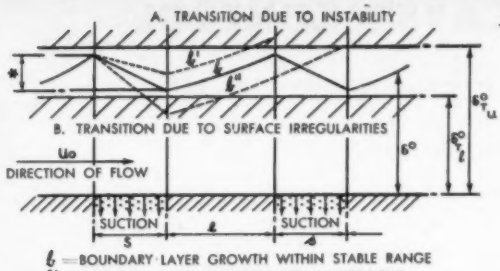

A. TRANSITION DUE TO INSTABILITY
B. TRANSITION DUE TO SURFACE IRREGULARITIES
Uo
DIRECTION OF FLOW
SUCTION
SUCTION
6°
6°
BOUNDARY LAYER GROWTH WITHIN STABLE RANGE
BOUNDARY LAYER GROWTH WITH INSUFFICIENT SUCTION (PREMATURE TRANSITION DUE TO INSTABILITY)
BOUNDARY LAYER GROWTH WITH EXCESSIVE SUCTION (PREMATURE TRANSITION DUE TO ROUGHNESS)
* STABLE PRACT. RANGE WITH MARGIN FOR SMALL VARIATIONS OF C.Q.

CHART 2: Mechanism of boundary layer suction through discrete strips of porous material.

of the favorable pressure gradient, should overlap the suction areas.

• **Pressure drop** through the suction surface must be greater than pressure variations chord-wise or span-wise to prevent outflow. For the same reason, it is advisable to divide up the internal space into cellular compartments by baffling before connecting them to the main manifold or suction duct.

• **For construction,** Lachmann foresees the stress-bearing sandwich (as on the Handley Page Herald) as excellent for providing the ducting with, probably, a pre-fabricated plastic sheath to serve as suction skin and to give the necessary smooth exterior.

• **Suction pressure** will have to be graded with, preferably, three stages to meet the changes of pressure over the wing surface. A three-stage axial compressor of 2.5 to 3 pressure ratio would be suitable and could be used to re-energize the removed boundary layer and eject it at a speed higher than the free airstream.

• **Propulsion** of a laminarized airplane, with a cruising speed of Mach 0.8, is envisaged with ducted fan or by-pass engines, since the complexities of pusher turboprops are very great. With laminarized wing and tail the fuselage drag becomes a large percentage of the whole. Laminarization of the fuselage of a transport would, however, mean elimination of windows and of any raised cockpit. As an alternative Lachmann suggests re-energizing the fuselage boundary layer at its point of separation to the free-stream velocity. This would at least practically eliminate the drag of the body wake, which is at present accepted as inevitable.

• **The laminarized** airplane would require so low a cruising power that supplementary engines would be required for take-off and climb—small lightweight units of the type of the Rolls-Royce Soar would be practical. As an example of the power saving, Lachmann suggested that a North Atlantic airliner with 25,000 pounds payload would require four by-pass engines with only 30% of the power of the Rolls-Royce Conway—that is the equivalent of only 12,000 pst.

Highlight of the lecture discussion was the revelation by Johnson of the RAE that flight testing had been in progress for two years using a sleeve on the upper surface of a jet airplane *(probably a Vampire)* wing. The test section has a chord of 8 feet and a width of 4 feet 6 inches and is porous from 6% chord to the trailing edge, tested to a CL of 0.2 to 0.45 and at a Reynolds number of 25 x 10^6. Full chord laminar flow has been maintained almost to the critical Mach number of the airfoil. *Drag reduction was "better than 70%."*

In an exclusive AMERICAN AVIATION interview, Dr. Lachmann declared that the aerodynamic know-how is here for both types of circulation control and now is the time to attack the engineering problems. The suction characteristics can now be calculated with good accuracy and it is only necessary to put small test panels representative of suction surface construction on airfoil models as a tunnel check. Gone are the days of highly polished specimens—the finish that matters is now known for given conditions.

The British expert emphasized the following points:

• **The laminarized transport** must be designed by taking a required payload and range, then evolving the integrated airframe and powerplants to achieve the results.

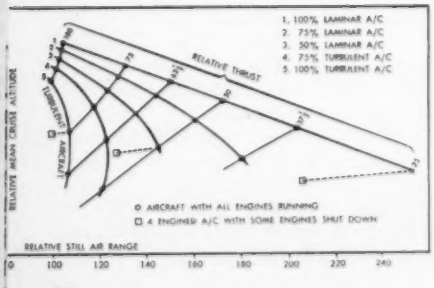
• **With air pumps** and ducting designed into the wing and tail, weight penalty will not be great and can be more than recovered by its use for super-circulation for take-off and landing. The laminarized transport will, therefore, be much more economical *and* will have shorter take-off and landing runs.

• **With super-circulation,** short-haul inter-city transports with 500 feet to 50 feet characteristics and stalling at less than 50 mph are practical possibilities and could be more economical than helicopters.

• **Noise** will be greatly reduced by use of ducted fans combined with boundary larger propulsion.

• **Although fuel saving** will be very great, criterion for comparison is not cost per ton-mile, but the revenue potential, i.e., the annual total of freight and passengers represented by the fuel saved. • • •

CHART 3: Relative effect of various degrees of laminarization of wing and tail on range, cruising altitude, and thrust.



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supersonic fighter for the U. S. Navy

LOCKHEED F-104
high-performance fighter for the U. S. Air Force

DOUGLAS A4D "Skyhawk"
carrier-based attack bomber for the U. S. Navy

NORTH AMERICAN FJ-3 "Fury"
carrier-based fighter for the U. S. Navy

NORTH AMERICAN FJ-4
advanced shipboard fighter for the U. S. Navy

REPUBLIC RF-84F "Thunderflash"
photo reconnaissance fighter for the U. S. Air Force

REPUBLIC F-84F "Thunderstreak"
fighter bomber for the U. S. Air Force

MARTIN B-57
light bomber for the U. S. Air Force
(plus other high-performance military aircraft of classified status)

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Today, the J65 JET at 7800 lbs. thrust is the choice of the U.S. Navy for its latest carrier-based fighter, the North American FJ-4. Still conservatively rated, the J65 continues to provide the growth capacity to meet the requirements of tomorrow's advanced aircraft.

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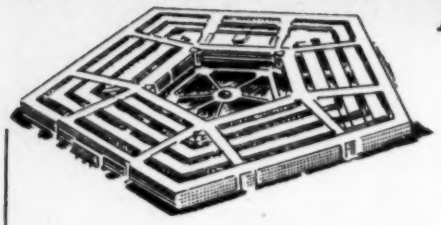


A MILITARY COMMENTARY

By Harry S. Baer, Jr.

AF hopes the airliners will service test its six new turboprop-powered transports

THE AIR FORCE has a plan that may speed up use of turboprop transports by U. S. airlines.

It is a proposal for commercial carriers to service test six of the AF's new turboprop-powered aircraft—an opportunity for airlines to obtain operational "know-how" on a new transport type that is becoming increasingly important.

This idea has a great deal of merit and 10 airlines which have received an exploratory briefing on it express a definite interest. But a number of factors will have to be ironed out.

Many of these were discussed at a meeting last month between airline representatives and the AF at Wright-Patterson AFB, Dayton, O. This was their second get-together.

Maj. Johnson

The first meeting was held Oct. 29 in the Pentagon. Airlines represented included American, Braniff, Eastern, National, Northwest, Pan American, TWA, Seaboard & Western, Slick, and United.

They were told about the six planes being considered for the program: two Convair 340's (YC-131C's) powered by Allison T56's, two Boeing Stratocruisers (YC-97J's), and two Lockheed Super Constellations (YC-121F's). The latter two types are powered by Pratt & Whitney T34's. The YC-131C's employ Aeroproducts propellers, the YC-97J's use Curtiss-Wright propellers, and the YC-97J's have Hamilton Standard propellers.

They were briefed on what the AF was seeking—a rapid means of accumulating flight time on these turboprop transports. In addition, the airlines were asked to pay some of the operating expenses.

AF spokesmen at the briefing were Lt. Gen. Donald L. Putt, Deputy Chief of Staff Development; Col. Allman T. Culbertson, chief of the Supporting Services Group, Directorate of Research and Development, DCS/D; and Maj. George W. S. Johnson, assistant for aircraft to Culbertson and project officer for the proposed program.

The airlines were asked to mull over the idea, then respond by letter by mid-November as to whether they would be interested.

"All of the airlines responded on schedule," Johnson says, "and expressed sufficient interest to warrant additional meetings to go into further details. They, of course, raised a number of questions."

Typical questions: Could the airlines use the aircraft for revenue purposes, i. e., carrying cargo or mail, during the service tests? Would the airlines or AF be responsible in case of accident? What method of ground support would be used and how costly would it be if the six transports were operated by different airlines from various points in the U. S.?

At this stage, it appears unlikely that the experimental transports may be used in revenue-gaining operations. To get such sanction from CAA would be time-consuming since there is no precedent.

What prompted the AF proposal? Johnson sums it up in this fashion:

"Something is needed to get people moving on turboprop transports. And we feel the interest in this field goes far beyond the Air Force. The Air Force program is designed primarily to improve the reliability of turboprop engine, and we think the airlines might like to gain some operational knowledge in the process.

"The Air Force is paying for the aircraft, and now we are faced with the operating expenses—minor in comparison with the overall cost of the program. Perhaps some airlines will be interested in paying part of the service test operating expenses in order to obtain early experience in turboprops."

If the AF plan is accepted by the airlines, the disposition of the six aircraft will be decided on a competition basis: the carriers which offer to provide the most flight time and "kick in" with sufficient amounts of airline money will get contracts.

At this point, the success of the program is conjectural. AF details are still too hazy for the airlines to jump in—but none are turning their backs on the suggestion.

The two 340's are ready for service testing now, but the Stratocruisers and Super Connies won't be available until at least next fall. Thus, there is ample time for discussion.

If the AF-airline proposition does not materialize, the service test chore will be accomplished by MATS, which already has a special squadron in the early stages of formation at Kelly AFB, Tex. But the door would still be wide open for airlines to follow the program.

If the proposal makes the grade, however, it could provide that additional impetus needed to advance U. S. commercial transportation. • • •

YC-131C: Two are ready for testing

HOW ELECTROL DROP TESTS LANDING GEAR

KINGSTON, N. Y. — Successful completion of a flight may hinge on a plane's powerplants, the weather, or a dozen other factors, up to a point—the point of touch-down. From that moment until the plane stops rolling its safety depends on its landing gear.

For the handful of firms building landing gear, one of the most valuable facilities in development and testing is the drop test gear. In this test the landing gear unit is dropped from varying heights and at varying loads as engineers attempt to wring the last few percentage points of efficiency from the system.

Here at Electrol, Inc., development tests have recently been completed on the nose gear of the Aero Commander, six-place transport manufactured by the Aero Design and Engineering Co. The program was the latest in a series that stretches back to 1946, when Electrol entered the field. Starting with Republic's amphibian Sea-Bee, the company has designed and manufactured landing gear units for such aircraft as the Ercoupe, Grumman SA-16 rescue amphibian, Sikorsky S-55, Republic F-84, Piper Apache, Bell X-5, and McDonnell F2H Banshee.

For all the design programs the drop tower serves much the same purpose: *To develop optimum energy-absorption characteristics through selection of size of the orifice through which the hydraulic fluid flows in the oleo strut, providing the shock-absorbing action.* Here's how it goes:

• **Development testing** starts with a relatively small orifice. Metal slabs, each weighing 75 pounds, are put into a rectangular "basket" above the gear. Then test drops are made, each three inches higher than the last. During the first three quarters of the program mechanical accelerometers record the g-loads to which the gear is subjected.

• **When the drop height** is such that the limiting g-loads have almost been reached, the gear is disassembled and a larger orifice is installed. The series of drops is then resumed, getting steadily higher, with the orifice being enlarged as often as necessary to obtain satisfactory characteristics.

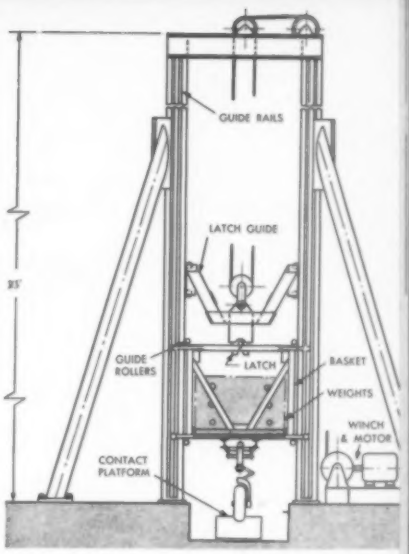
• **These tests** determine the manner in which the gear absorbs impact loads, and also insure that the g-forces do not exceed specified limits. They do not test the structural strength of the gear.

• **The g-forces** are measured by accelerometers mounted on the gear. Length of strut stroke is determined by devices attached to the axle. Displacement of the mass of the wheel and its loaded basket is measured by a slide-wire which records varying electrical resistance as the equipment drops.

• **As the program nears** its conclusion, the mechanical accelerometers, which are quickly read and reset, are replaced by pick-ups which transmit information to a recording oscilloscope. From it a photographic record is obtained (*see illustration*), with accelerations and displacements plotted against time.

• **The g-loads** are later plotted against the strut stroke as measured in inches. The area under the resulting curve, which is roughly rectangular, represents the efficiency of the gear.

If the desired efficiency cannot be obtained by varying the size of the single orifice, a second one may be provided. If the results are still unsatisfactory, a slender metal pin of varying cross-section may be installed so that it partially obstructs the orifice. As this metering pin moves through the orifice, the differences in its cross-section change the area through which the hydraulic fluid can pass, varying the rate of flow and consequently the performance characteristics.

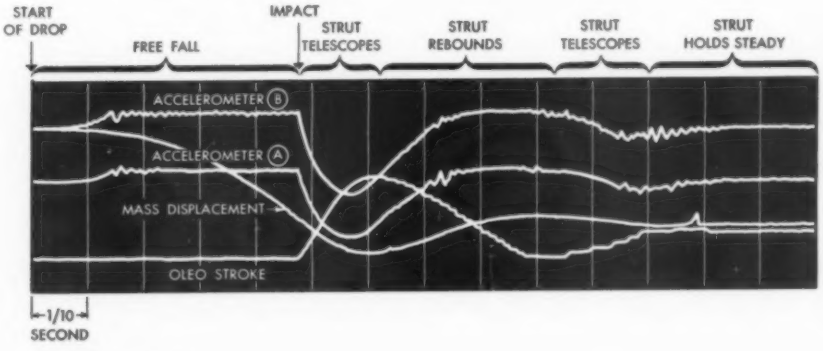


TOWER AT ELECTROL is 25 feet high, but most drops are two or three feet. Highest so far was close to six feet.

During part of the tests on the Aero Commander nose gear unit (*see photo*) the basket was loaded with two metal slabs, weighing 150 pounds. The basket itself and the unsprung weight of the gear added an additional 750 pounds, for a total of 900. This represented the nose gear's share of the two design gross weights of the Aero Commander—6000 and 6700 pounds. The strut was Electrol's Model 400-101. From a height of 18.7 inches it was tested for a vertical descent of 10 feet per second.

• **On another** typical test program, Electrol started with a specified tire size and pressure, a landing gross weight of 7420 pounds, a maximum ul-

TYPICAL OSCILLOSCOPE record of test shows accelerations measured by two pick-ups, travel of oleo strut, displacement of wheel-and-basket.



AERO COMMANDER nose gear before drop test. Impact platform is tilted to provide aft load.

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Map shows major routes of these 18 Super Constellation airlines:

(Figures represent total unduplicated route miles for each airline.)

- Air France 162,000
- Air-India International 16,100
- AVIANCA (Colombia) 28,500
- Cubana (Cuba) 8,600
- Deutsche Lufthansa (Germany) 11,200
- Eastern Air Lines 12,700
- Iberia (Spain) 41,000
- K L M (Holland) (144,000)
- LAV (Venezuela) 16,700
- Northwest Orient Airlines 17,300
- Pakistan International 5,200
- QANTAS Empire Airways 68,800
- Seaboard & Western (All-cargo routes applied for)
- TAP (Portugal) 11,300
- Thai Airways (Thailand) 19,700 (proposed)
- Trans-Canada Air Lines 19,000
- TWA-Trans World Airlines 33,000
- VARIG (Brazil) 19,000

Insignia on map show airline headquarters.

Every month another airline starts

Super Constellation Service

To you this means that soon you can fly more places faster, in greater comfort than ever before . . . on big, fast, luxurious transports that are world-renowned for dependability —*Lockheed Super Constellations* . . . now with turbo-compound power.

Already more new Super Constellations are being built to airline order than any other comparable air transport . . . ordered by more than twice as many leading world airlines. So many, in fact, that every month during 1954 a different airline started Super Constellation service. This record is continuing in 1955.

More world airlines (18) have ordered the Super Constellation than any comparable transport—worth remembering next time you fly.

Lockheed

AIRCRAFT CORPORATION

BURBANK, CALIFORNIA, AND MARIETTA, GEORGIA

Look to Lockheed for Leadership

timate load factor of 5.7 g's, a maximum vertical wheel travel of 7 inches, maximum strut stroke of 2.59 inches, and other basic data. From this it was determined that the weight of the test load should be 2490 pounds, that the tire deflection would be 3.8 inches, and that the maximum g-load allowable in the test set-up would be 6.16 g's at 100% load. A complete development program on the drop test tower may take a week or a week and a half.

Electrol was not originally in the business of drop-testing landing gears, Before the war the company manufactured oil burners and magnetos. In 1940 it branched out into wartime production of hydraulic systems and in 1946 it entered the landing gear field. A major share of its business is still in a variety of hydraulic equipment, including boost cylinders for control surfaces, jet nozzle cylinders for 300° to 400° F operation, servo cylinders for helicopter controls, pumps, valves, and pressure regulators.

• **In fiscal 1946** its net sales were $2.24 million. By fiscal 1953 the figure had risen to $10.73 million. During the same period employment rose from 187 to 815. Since 1953 both figures have fallen off, but for the first six months of the current fiscal year the firm showed a profit on its (unaudited) sales of $2.32 million in contrast to a loss for a similar period the year before. Employment now stands at 500.

Electrol engineers are quick to admit that drop testing from a tower is second best to testing the airplane in actual landings, but they point to a series of advantages that make tower operation well worth Electrol's while:

• **During prototype construction,** jig testing is the only way of doing any drop tests at all.

• **Serious damage to the airplane** might result if it were subjected to as much pounding as the gear takes during a series of tests.

• **If the landing gear breaks** during the test in a tower, you don't wash out an airplane as a result.

• • •

PAA Goes Electric For Ramp Use

Pan American World Airways became the first airline to use all-electric tractors on the ramp at the San Francisco International Airport. Purpose is to eliminate fumes and noise. PAA has two electric tractors and one electric fork lift. The tractors have been modified with the addition of a special deck at the rear for last minute-luggage. Cruising speed loaded is 3½ mph. Empty they go 7½ mph. Maximum pull is one ton.

West Coast Talk . . . By Fred S. Hunter

- **Trade the stars for push buttons**
- **What will L.A.'s tax mean to costs?**
- **We've moved**

HERE WE GO again, starting another year, with the aircraft industry heading toward 60,000 feet and Mach 2 for operational performance. Pretty high; pretty fast. Puts a mounting load on the aircraft manufacturers, the engine builders, the systems producers, the pilots, and those funny-looking semi-pressure suits.

An engineering test pilot, who has had stars in his eyes ever since he saw his first airplane, summed it up the other day, a bit ruefully, as he struggled into his gear for another adventure up in his new environment: "I think maybe they'd better be hurrying up with those push buttons."

• •

IF YOU LIKE to look on the dark side of things, you will be pleased to know that the viewers-with-alarm in these parts have cooked up a new worry. This is the litigation coming up in Los Angeles County over property taxes levied against aircraft companies on materials used in fulfilling government contracts. They profess to see an implied threat of government retaliation in the award of future contracts. Such as favoring Lockheed's Marietta plant over Burbank. Or Douglas at Tulsa against Santa Monica.

It's silly thinking. Let's take Lockheed. The 1954 personal property tax bill, which Lockheed paid in December (under protest, incidentally) amounted to approximately $1,250,000. Divide that into the 1954 total of military sales by Lockheed's California division, which probably was about $400 million, and what do you get in terms of added cost to the aircraft? Less than 1/3 of 1%. As a matter of fact, less than half of what a 5¢ an hour wage increase would cost on the same volume of business.

• •

THE LOS ANGELES tax litigation undoubtedly will extend over several years. It's sure to go to the U. S. Supreme Court for final settlement because it involves what might be called a "loophole" in the law. The U. S. Constitution exempts government property from state and local taxation. The California assessors think they have found a period when the government doesn't actually hold title to the property that goes into its airplanes.

They make another point. Big defense contracts bring in many workers. The added population increases the cost of fire and police protection, streets, sewers, schools. This is one of the reasons school taxes in California have become very heavy. Who should foot the bill for this part of the cost of the guided missiles Convair, for example, produces for the country's defense? All of the taxpayers in the country or just those living in Pomona?

• •

NORTHROP is studying possible use of external fuel tanks to stretch out the range of the Snark . . . AIRCRAFT PARTS houses hope the Wright Field report that the Air Force will do more buying from them in 1955 turns out to be true . . . SAS CREWS on the Polar route have 10 days on the road, with three-day stopovers each way at Winnipeg and overnight in Los Angeles . . . W. A. PATTERSON ruled UAL stewardesses should not mix drinks, which is why the martinis come "on the rocks" on United's DC-7's and you do your own pouring . . .HILLER Helicopters is now classified as an Army ground forces facility, for which Ed Bolton and Bob Wagner should be entitled to take a bow.

• •

WE ARE NOW in our new offices in smog-free (we hope) Beverly Hills. This is Gen. Harold George's town. He's the mayor. We cite this to show how we are coming up in the world. There's a carpet on the floor, too. Anytime you are out this way drop in. The address is 8943 Wilshire Blvd. That's right on the route to Romanoff's, Chasen's, the Brown Derby, or Barney's Beanery. Free parking.

New Products and Processes

Metal-Cals, Developed for Aircraft by Boeing, Have Uses in Many Fields

Boeing Airplane Co.'s Metal-Cal is another example of an aircraft development that is showing a far greater potential in the commercial field.

Metal-Cal is the registered name for the chemically processed aluminum decals produced by Boeing for its own use at Seattle and by the C & H Supply Co. (under license from Boeing) for all other users—including, incidentally, Boeing-Wichita.

The Metal-Cals have gone a long way toward solving the aircraft industry's name-plate and decal problem. But now commercial orders are rolling in on C & H, which moved its manufacturing division from Seattle to Inglewood, Calif., in 1952.

An average aircraft order for Metal-Cals is for 50 or so. An order from a golf club maker runs into millions.

"But we still want the orders for 50 from the aircraft industry," said P. S. Coffer, Jr., C & H vice president. "We'll take an aircraft order for a single Metal-Cal, too, and we got one just the other day from North American Aviation. Our aircraft obligation is our first interest."

Current production volume at C & H is about 50-50 aircraft and non-aircraft. An average aircraft order for a particular design may be 50, but there may be quite a number of sets of 50. That's because there are so many applications per airplane. The B-47, for example, has in excess of 2500 applications. The B-52 has 4000.

Metal-Cals are made of .003-inch 2SH19 Alcoa aluminum and they're almost abrasive-proof. In 14- x 10-inch size, 25 sheets weigh one pound. The foil is given a chemical treatment which leaves it with a color-retention coating. Minnesota Mining & Manufacturing Co.'s SL-11559 is the adhesive used. Wind tunnel tests have demonstrated no loss of adhesion at speeds up to Mach 2.5.

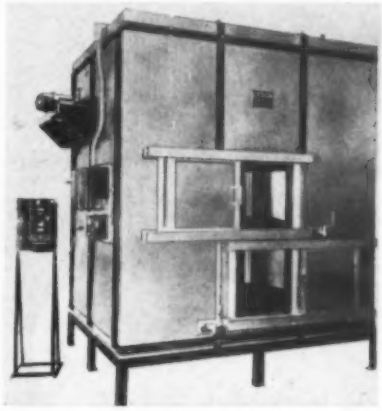
Boeing was building the Model 377 Stratocruiser in 1946 when the problem of developing longer lasting decals to mark "No Step" and "Jack Here" and other pertinent information became acute. Robert N. Page, Boeing research engineer, suggested the chemical approach. After it developed the process, Boeing turned the manufacturing over to the C & H Supply Co., a manufacturers' representative in Seattle specializing in aircraft accounts (AiResearch Manufacturing, Cherry Rivet, and Kohler valves).

C & H started out in May 1948 with a $35 order from Rohr Manufacturing Co. for Metal-Cals for the C-97 powerpack. Since then, the item has progressed into a wide variety of uses in the industry. Leach Relay, for example, has bought more than 1,000,000 Metal-Cals to identify its relays. Bendix Aviation used the featherweight Metal-Cal to replace a main strut nameplate which, including the straps to attach it, weighed approximately a pound.

Circle No. 17 on Reader Service Card page 65, for more information.

Cylinder Oven

A new 60 kw 600°F electric oven for heating aircraft engine cylinders for installation of shrink fit parts is announced by Lydon Brothers, Inc. The

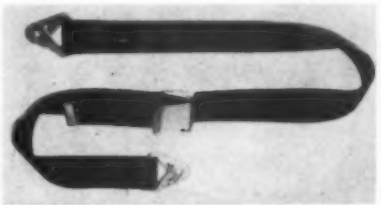


new unit has a rotating hearth and will handle 18 14"-wide x 19"-high cylinders on two decks. Open coil elements are used for heating.

Circle No. 18 on Reader Service Card, page 65, for more information.

Safety Belt

A new lightweight safety belt introduced by Brown-Line, Inc., utilizes a 4-ounce buckle that represents a 27% weight saving over any present competitive buckle, the manufacturer states.



Webbing is nylon-rayon and a special cam action is said to increase holding strength with less wear on the webbing.

Circle No. 19 on Reader Service Card, page 65, for more information.

Alodine Finish

Annual savings up to $300,000 are anticipated by Boeing Airplane Co. as the result of a new alodine protective finish process for non-clad aluminum alloys recently placed in operation at its Seattle plant.

The $340,000 Boeing installation, believed to be the largest of its kind in the country, consists of nine 80-foot tanks measuring 4½ to 5 feet wide, each ranging in depth from 5 to 10 feet. Capacity of each tank is 20,000 gallons.

Parts are run through the alodine tanks in about one hour, with traveling cranes moving racks of parts from one tank to another during the cycle. Eight of the tanks are used in the alodine process and the ninth for chromodizing Alclad parts in preparation for painting.

Circle No. 20 on Reader Service Card, page 65, for more information.

Two-Way Radio

A new packaged two-way radio developed by Motorola Communications and Electronics Div. operates inter-

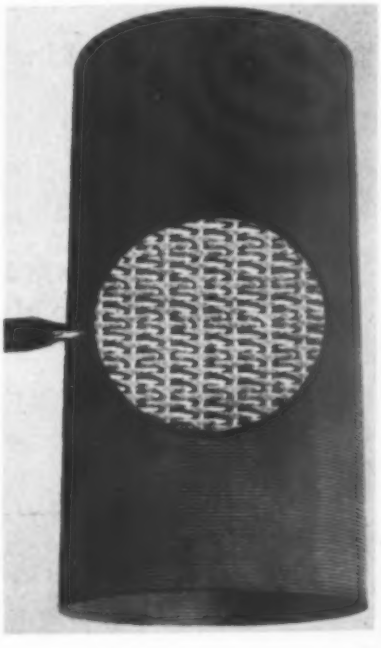
changeably from either 6- or 12-volt battery installation and fits into a standard 15" housing. The new system is particularly designed for use in industrial areas having high audible noise levels. Audio output is 10 watts and r-f output is 25 watts.

Circle No. 21 on Reader Service Card, page 65, for more information.

Porous Metal

Aircraft Porous Media, Inc., has developed "Rigimesh" a new porous medium for jet engine afterburner liners, ramjet combustion chambers, and turbine blades.

The new material is fabricated by welding the strands of one or more layers of woven wire cloth, then mechanically treating it to produce a plate having much finer openings but with the characteristics of the starting material. According to its producer, with Rigimesh flow capacity of coolant gases



THESE FOUR HARLEY ITEMS ARE STANDARD EQUIPMENT on the

FOR INFORMATION ON THESE AND OTHER HARLEY ITEMS NOW ALL AVAILABLE IN THE U. S. AND CANADA WRITE

Harley PATENTS, INC.
607 FIFTH AVENUE NEW YORK 17, N. Y.

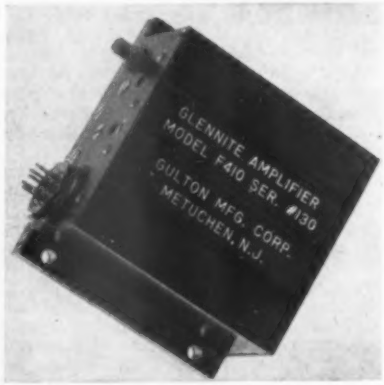
Circle No. 7 on Reader Service Card.

and liquids can be varied from as much as 15 ft. per second at 1 psi differential to as low as 0.2 fps at the same pressure.

Circle No. 22 on Reader Service Card, page 65, for more information.

Preamplifier

The model F-410 subminiature preamplifier developed by Gulton Mfg. Corp. for missile and aircraft applications weighs only six ounces. Measuring 2 11/16" W, 1 3/16" H, and 2¼" L, the



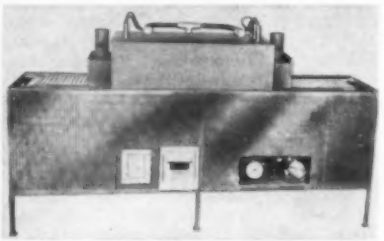
F-410 incorporates a cathode follower input to give an input impedance of 100 megohms.

The company has also developed a new .017" OD coaxial cable for use in connecting electromechanical transducers, but which is also adaptable for RF applications having a characteristic impedance of 40 ohms and insulation strength of 1200 volts d-c.

Circle No. 23 on Reader Service Card, page 65, for more information.

Production Soldering

A new continuous production soldering oven marketed by Electric Industries uses far-infrared Chromalox heaters that feature fast warm-up and uni-



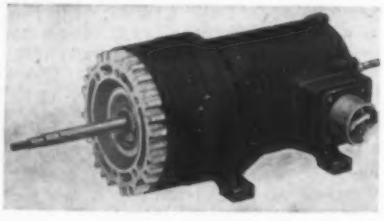
form heat distribution.

Conveyor for the production solder unit is powered by a ¼ hp motor and can be operated at five speeds. Three 1100-watt heaters give a density of 40 watts per square inch.

Circle No. 24 on Reader Service Card, page 65, for more information.

Pump Motor

A single gearhead motor designed by Lear, Inc., Grand Rapids Division.



takes the place of two separate motors

Westinghouse unit consists of a tiny

KOLLSMAN
PRESSURE RATIO
THRUSTMETER
used on
Convair's F-102
McDonnell's F-101

which way* to measure jet engine performance?

THRUSTMETERS

to indicate PRESSURE RATIO
to indicate DIFFERENTIAL PRESSURE

TYPICAL SYSTEM OPERATIONAL DATA

1. Accuracy: .015 in 100% of readings at room temperature.
   .025 in 85% of readings at −55°C and +70°C.
   .035 in 15% of readings at −55°C and +70°C.
2. Altitude: No specific limitation.
3. Power: 115V, 400CPS, single phase, 18VA
4. Pressure Ratio Range: 1.2 to 3.4
5. Pressure Ranges (operating):
   Pt_2=2 to 50" Hg. Abs.
   Pt_7=2.4 to 100" Hg. Abs.
   Pt_7-Pt_2=0.4 to 70" Hg.
6. Temperature Range: −55°C to +70°C.
7. Weights:
   Transmitter: 2.2 lbs.
   Indicator (including integral amplifier): 1.8 lb.
8. Response: Full Range in 7 seconds.

Actual photograph

KOLLSMAN is in production . . .

on components for BOTH TYPES — for Remote or Direct reading

For over a quarter century, Kollsman has been making precision pressure sensitive mechanisms using displacement type diaphragms. This diaphragm can be called the heart of a thrustmeter pressure indicating system.

Our long experience making displacement type diaphragms guarantees reliable thrustmeters.

Proven Kollsman displacement type diaphragms, when fitted with Kollsman Synchrotels, comprise the transmitters for remote indicating types. Thousands of Synchrotels are now in use in other applications equally demanding of accuracy and durability.

Tailor-made Thrustmeters can be supplied for any engine-airplane combination. Write for complete technical information.

**The Pressure Ratio System has advantages for indicating optimum climb and cruise throttle setting, whereas the Pressure Differential System has a definite advantage at take-off.*

kollsman INSTRUMENT CORPORATION

80-12 45th AVE., ELMHURST, NEW YORK • GLENDALE, CALIFORNIA • SUBSIDIARY OF *Standard* COIL PRODUCTS CO. INC.

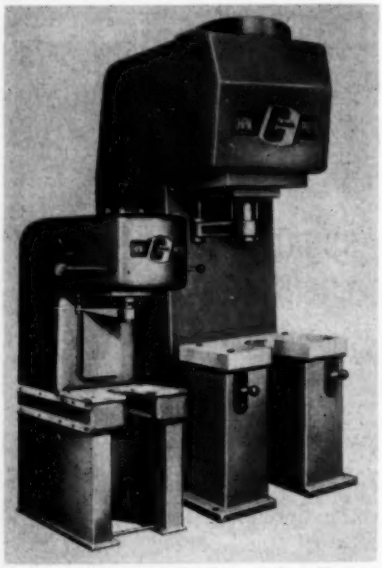
takes the place of two separate motors for two-stage hydraulic or air pressurization pumping systems. The Series 30-AR-14 unit uses a hollow motor design in which the two stages of the system are driven separately by opposite ends of a single output shaft.

Rating of the Lear motor is ⅓ hp continuous duty and power requirements are either 115-volt delta or 200-volt wye, 400-cycle, 3-phase. Motor operates at 11,000 rpm and a variety of gear trains are available to suit special requirements.

Circle No. 25 on Reader Service Card, page 65, for more information.

Hydraulic Presses

New C-frame oil hydraulic presses in eleven sizes ranging from two tons to 200 tons have been unveiled by The Hydraulic Press Mfg. Co. Featured on

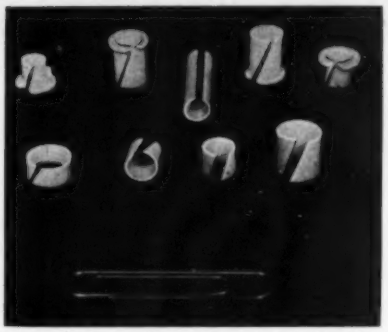


each model are a high speed differential circuit and inching control which permits the operator to "inch" the ram upward or downward while setting dies.

Circle No. 26 on Reader Service Card, page 65, for more information.

Nylon Bearings

A series of miniature nylon bearings for use in instruments and other small mechanisms has been announced by Thompson Industries, Inc. Produced in either the straight sleeve bearing or

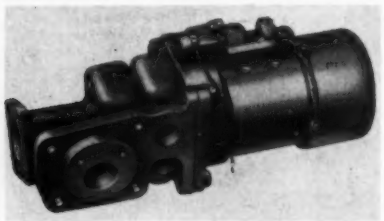


flanged type, the new miniature Nyliners incorporate the compensation gap design principle to eliminate dimensional changes that occur in nylon due to moisture absorption and temperature variation.

Circle No. 27 on Reader Service Card, page 65, for more information.

Booster Pump

Pesco Products Division, Borg-Warner Corp., has developed a new centrifugal impeller type fuel booster pump that weighs 7.4 pounds and maintains full flow of JP-4 jet fuel up to 45,000 ft. altitude. It is designated for use in



the Navy's North American FJ-4 Fury fighter.

The Model 122913 pump is self-priming and is said to be able to pump boiling fuel, run dry for 15 hours, and then reprime itself. It is d-c electric-motor-driven and overall dimensions are 11" x 5" x 5".

Circle No. 28 on Reader Service Card, page 65, for more information.

Gyro Motor

A new dime-sized gyroscope motor developed by Westinghouse Electric Corp. for use on the moving antenna of a fire-control radar operates on less than a volt per phase and turns at 8000 rpm.

A 2-phase 400-cycle motor, the Westinghouse unit consists of a tiny wound stator and a rotor that also serves as the inertia wheel of the gyro-

scope. The gyro measures the angular movement of the antenna thereby permitting computers to calculate firing information.

Circle No. 29 on Reader Service Card, page 65, for more information.

Heater Kit

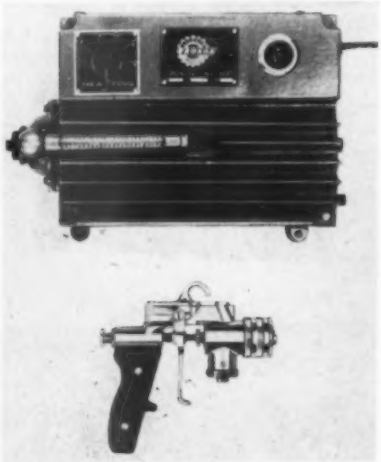
Hardman Tool and Engineering Co. is marketing a new exhaust repair kit for Janitrol series 88-A-92 combustion heaters used in Douglas DC-6 and DC-7 aircraft.

Already in extensive use by one major airline, the Hardman Model 3304 kit has reportedly extended heater life several times above the normal period at only a fraction of heater replacement cost.

Circle No. 30 on Reader Service Card, page 65, for more information.

Hot Spray Painting

Conversion of existing cold paint spray systems to hot volume air spraying is possible with a new Model V-950 ThermoVolumaire unit marketed by



Roxon, Inc. Priced at $300.00, the new Roxon device controls temperatures between 80° and 250°F. Standard high-pressure air and paint hoses are simply attached to the heating unit.

Circle No. 31 on Reader Service Card, page 65, for more information.

Synchronizer Testing

A new all-electronic test stand developed by Greer Hydraulics, Inc., is designed for complete overhaul testing of propeller synchronizer assemblies. With a synchronizer, necessary stepmotor heads, and tachometer generators connected to the stand, a complete pro-

WORLD'S PREMIER AIRPLANE FABRIC

lighter - - - - - stronger - - - - - smoother

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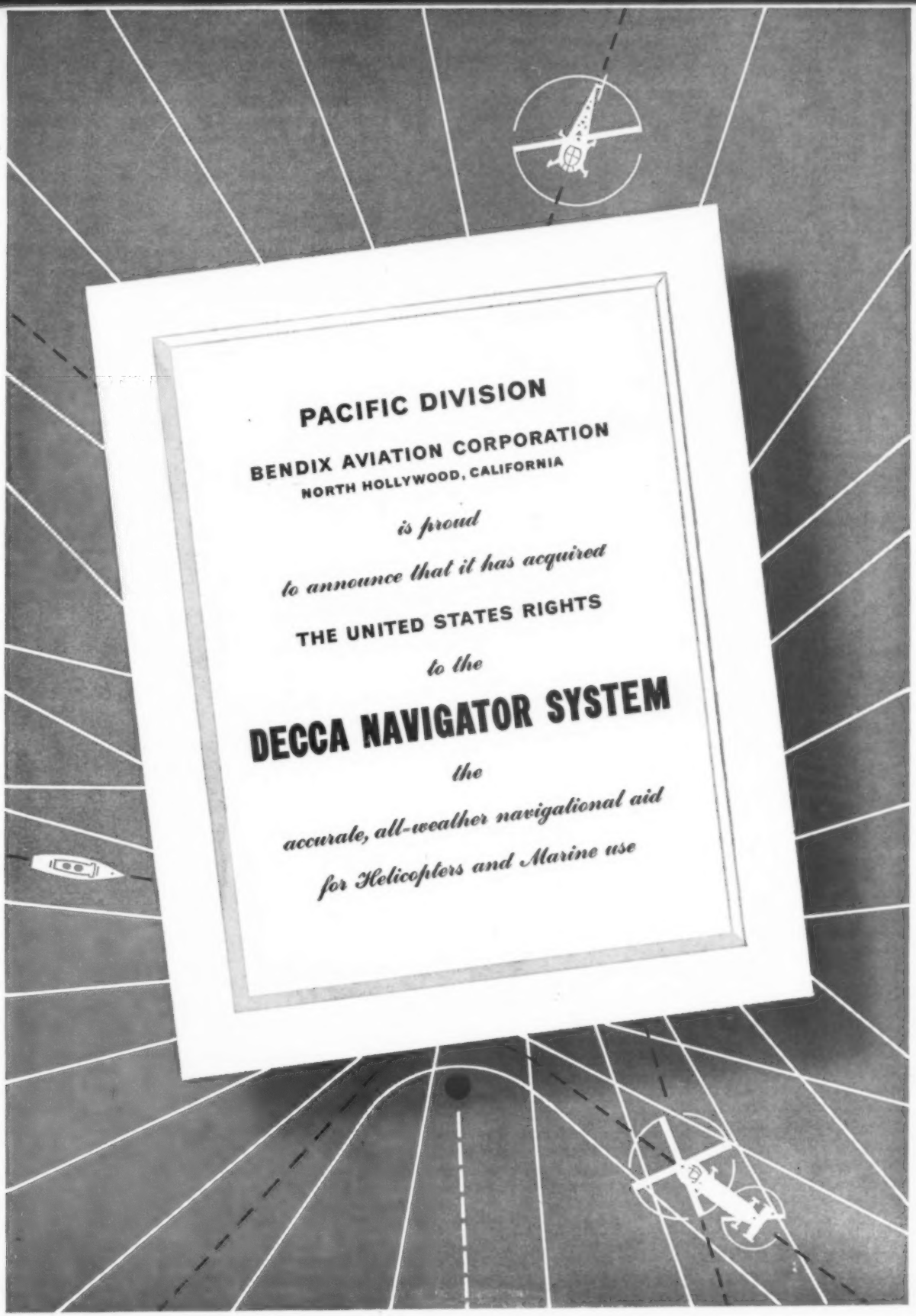


Circle No. 10 on Reader Service Card.

NEW **HIGH** ACCURACY

LOW WEIGHT

SYNCHRO RECEIVERS

Weight of this receiver is less than 2 oz.—torque exceeds 2,300 mg mm/degree—accuracy 30 minutes, total error spread. Used in conjunction with a Clifton transmitter, overall system errors of less than 40 minutes spread—±30 minutes approximately—are to be anticipated.

The same engineering team that developed the original 1.437" diameter high precision synchro has immediately available on a production basis these high torque high accuracy transmitter-indicator combinations at a saving of almost two-thirds the weight.

For full information on these and other units of this complete series of high accuracy Size #10, Size #11 and Size #15 units, write or telephone T.W. Shoop, Sales Manager, MAdison 6-2101. (Suburban Philadelphia)

cppc

CLIFTON PRECISION PRODUCTS COMPANY INC.

CLIFTON HEIGHTS 11 PENNSYLVANIA

Circle No. 11 on Reader Service Card.

peller synchronizer can be formed for analysis and testing.

Earlier Greer stands of this type now in service can be modified to provide the new electronic features.

Circle No. 32 on Reader Service Card, page 65, for more information.

Precision Snap Switch

The W. L. Maxson Corp. Unimax Division has unveiled a new precision snap switch which features a movement differential of only 0.0005" maximum, low actuating force, and high repeat accuracy. Designed particularly for use in pressure-sensitive thermostatic controls. The new Unimax series is rated at 15 amperes, 125/240/480 volts a-c. Literature available.

Circle No. 33 on Reader Service Card, page 65, for more information.

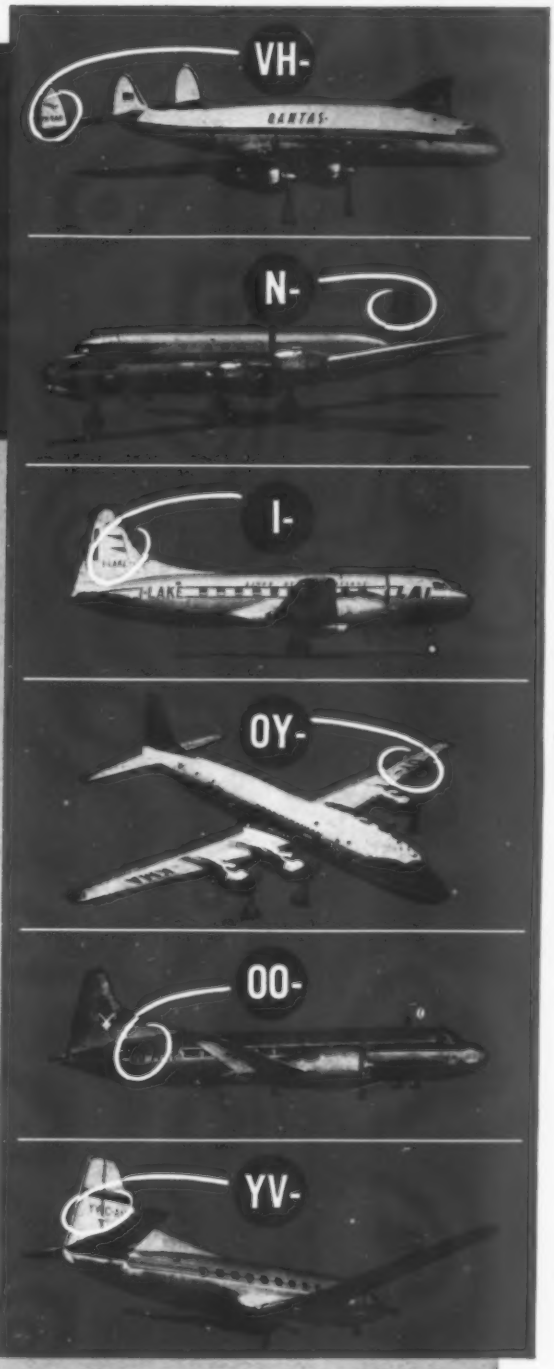
Potentiometer

New series of vibration-proof pressure-actuated potentiometers for supersonic aircraft announced by Trans-Sonics, Inc., are designed to maintain accuracy while subjected to ± 10g shock

loads up to 500 cycles per second. For missile use, models are rated to withstand ± 25g loads from 0 to 2000 cps.

Circle No. 34 on Reader Service Card, page 65, for more information.

VICKERS® HYDRAULICS *is used* WORLDWIDE on Air Transport



AIRCRAFT NATIONALITY MARKS

Afghanistan	YA
*Argentina	LV
*Australia	VH
Austria	OE
*Belgium	OO
* Belgian Congo	OO
*Bolivia	CP
*Brazil	PP, PT
*Burma	XY, XZ
*Canada	CF
*Ceylon	CY
*Chile	CC
*China (Taipeh Taiwan)	XT
*Colombia	HK
*Cuba	CU
Czechoslovakia	OK
*Denmark	OY
*Dominican Republic	HI
*Ecuador	HC
Egypt	SU
El Salvador	YS
*Ethiopia	ET
*Finland	OH
*France	F
*Greece	SX
Guatemala	TG
Haiti	HH
*Iceland	TF
*India	VT
*Indonesia	PK
Iran	EP
Iraq	YI
Ireland	EI, EJ
*Israel	4X
*Italy	I
*Japan	JA
Jordan	TJ
Lebanon	OD
Liberia	EL
Luxembourg	LX
*Mexico	XA, XB, XC
*Netherlands	PH
* Netherlands Antilles	PJ
* Netherlands Surinam	PZ
* Netherlands New Guinea	JZ
*New Zealand	ZK, ZL, ZM
*Nicaragua	AN
*Norway	LN
*Pakistan	AP
Panama	HP
*Paraguay	ZP
*Peru	OB
*Philippine Republic	PI
Poland	SP
*Portugal	CS, CR
*Saudi Arabia	HZ
*Spain	EC
*Sweden	SE
*Switzerland	HB
Syria	YK
*Thailand	HS
*Turkey	TC
*Union of South Africa	ZS, ZT, ZU
*United Kingdom	G
Colonies and Protectorates	VP, VQ, VR
*United States	N
*Uruguay	CX
*Venezuela	YV

*VICKERS AIRCRAFT HYDRAULICS IN USE

This table includes all nationality marks that have been formally notified to ICAO up to June 19, 1953. Seventy-five percent of the countries . . . those marked with an asterisk . . . have registered commercial aircraft which use Vickers Hydraulics. Vickers Hydraulic Equipment for aircraft is so widely preferred because it is dependable, efficient, light weight and compact. Ask for new Bulletin A-5200-B.

Write For Aircraft Registration Card

We have a new 2½" x 4" plastic wallet card which will give you a permanent record of world civil aircraft registration codes. We'll be glad to send you one . . . write today.

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6696

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Circle No. 12 on Reader Service Card.

Package Refueler

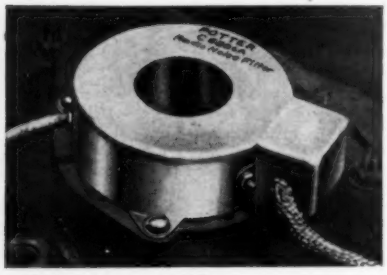
First photo of a packaged in-flight refueling unit by which bomber aircraft can be converted into aerial tankers has been released by Flight Refuelling, Ltd. A scale model of the packaged

probe and drogue system pictures the hose reel unit from which the drogue is trailed and the fuel supply tanks as a single unit. During field trials it has been installed in slightly more than 30 minutes.

Circle No. 35 on Reader Service Card, page 65, for more information.

Noise Filter

The Potter Co. has developed a new radio noise filter for fuel booster pumps that weighs 11.5 oz. and meets the requirements of specifications MIL-E-



5272A and MIL-P-5238.

Rated at 20 amps and designed for continuous duty, the new Potter filter measures 31/32" deep by 2 25/32" outside diameter.

Circle No. 36 on Reader Service Card, page 65, for more information.

X-Ray Inspection

One of the largest industrial X-Ray

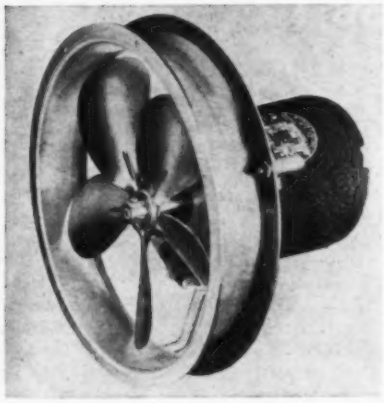
units in use in the aircraft industry has been placed in service by Pratt & Whitney Aircraft for detection of cracks, shrinkage, or foreign matter in engine castings and weldments.

The P&W machine is rated up to 250,000 volts and is installed in a special lead-enclosed room. It is the largest of more than twelve X-ray units now used by P&W for engine parts inspection.

Circle No. 37 on Reader Service Card, page 65, for more information.

Fan

Seven-inch, five-bladed fan built by Mission-Western Engineers, Inc., will move 525 cubic feet of free air per min-

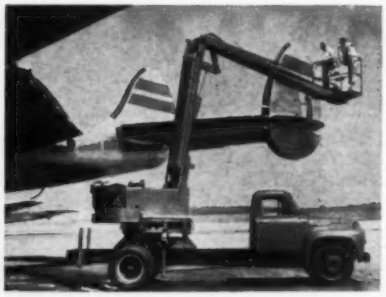


ute under the NEMA code. Designated Model F7-1, it operates at 3400 rpm, weighs 5 lbs. 10 oz., and runs on 115 volts a-c.

Circle No. 38 on Reader Service Card, page 65, for more information.

Aerial Platform

A new hydraulically actuated work platform introduced by Pitman Manufacturing Co. can be raised to a height of 40 feet and handles up to 450 pounds



at any radius with no outriggers.

The Pitman platform is sold as a self-contained unit that can easily be mounted on a truck. Foot-operated controls on the work platform permit the operator to adjust his position while keeping his hands free for work at all times.

Circle No. 39 on Reader Service Card, page 65, for more information.

Tank Ejection System

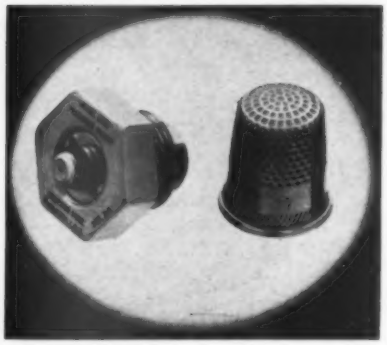
Simplified fuel tank and ejector pylon designed by Pastushin Aviation Corp. have been installed on the Lockheed F-94C Starfire. Safe action at any

speed or attitude is claimed for the design. The 230-gallon fuel tank has been approved by Wright Air Development Center for use with the ejector. The combination is said to reduce manufacturing costs.

Circle No. 40 on Reader Service Card, page 65, for more information.

Pressure Pickup

A piezoelectric ceramic sensing element used in the Model 2501 dynamic pressure pickup developed by Endevco eliminates the need for external power

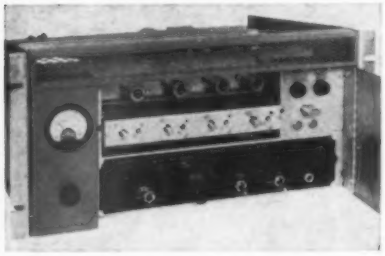


and allows use of instrumentation cables up to several hundred feet long. Units are available in three ranges: 0-500 psi, 0-1000 psi, and 0-2500 psi, and full-scale output for each range is in excess of 15 volts.

Circle No. 41 on Reader Service Card, page 65, for more information.

Fixed-Frequency Receiver

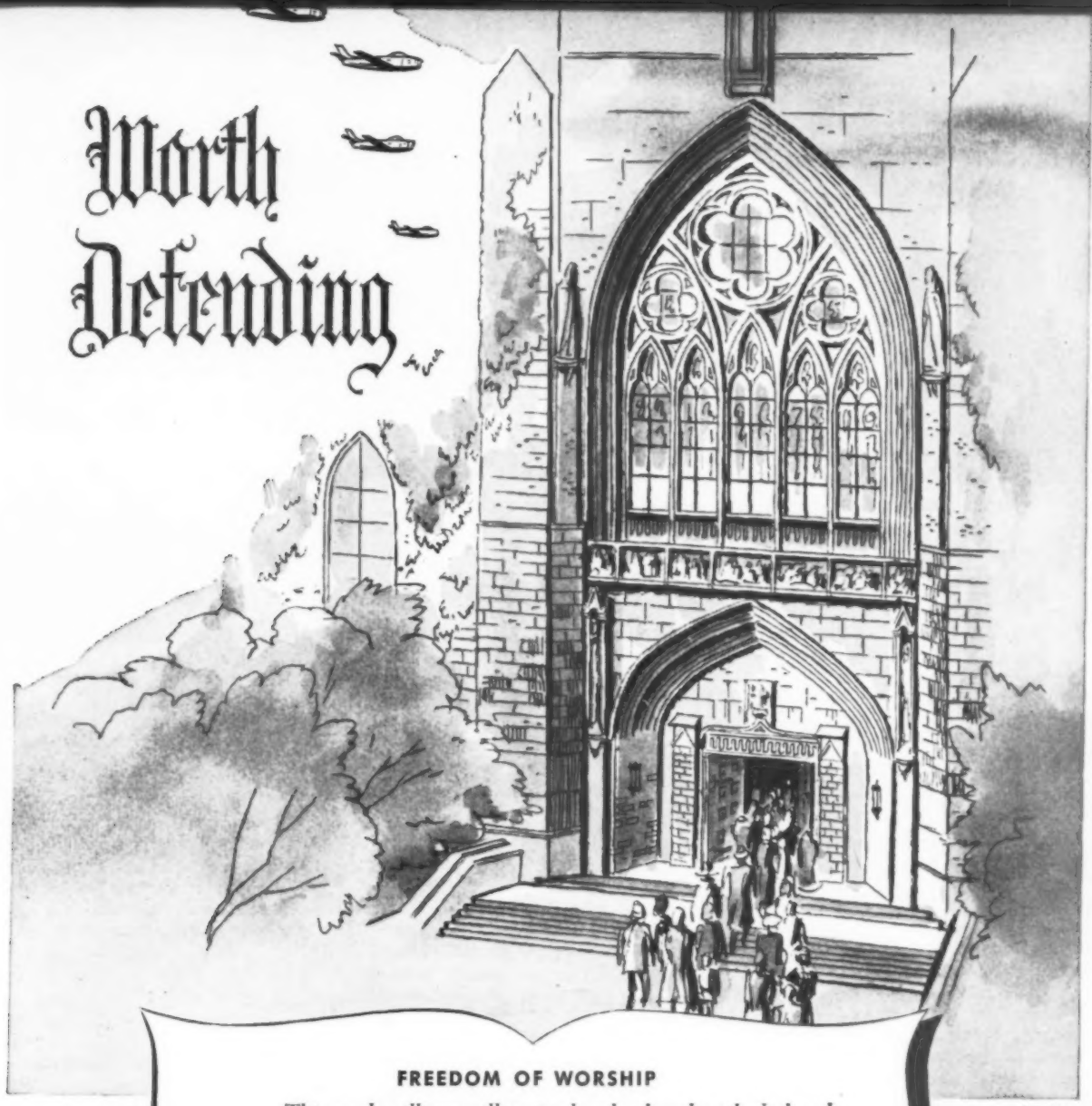
Single-channel receiver designed for unattended services has been placed on the market by Hammarlund Manufacturing Co. Can be tuned and crystal-



controlled on any frequency from 1.5 to 30 megacycles by any one of six plug-in subassemblies. Codan-type audio squelch circuit. Master-Slave feature of oscillators permits use in diversity system.

Circle No. 42 on Reader Service Card, page 65, for more information.

Worth Defending



CA54-1US7

FREEDOM OF WORSHIP

This week millions will go to church, chapel, cathedral and synagogue — without coercion, without having asked anyone's permission — or more significantly, without a look over the shoulder for secret police.

It was not so in the lands which suffered Nazi occupation; it is not so in the countries ruled today by communism's iron fist . . . and it will not be so if the communist germ is allowed to spread.

Preservation of our right to worship where we will as part of our free way of life needs defence today . . . and Freedom of Worship is *worth defending!*

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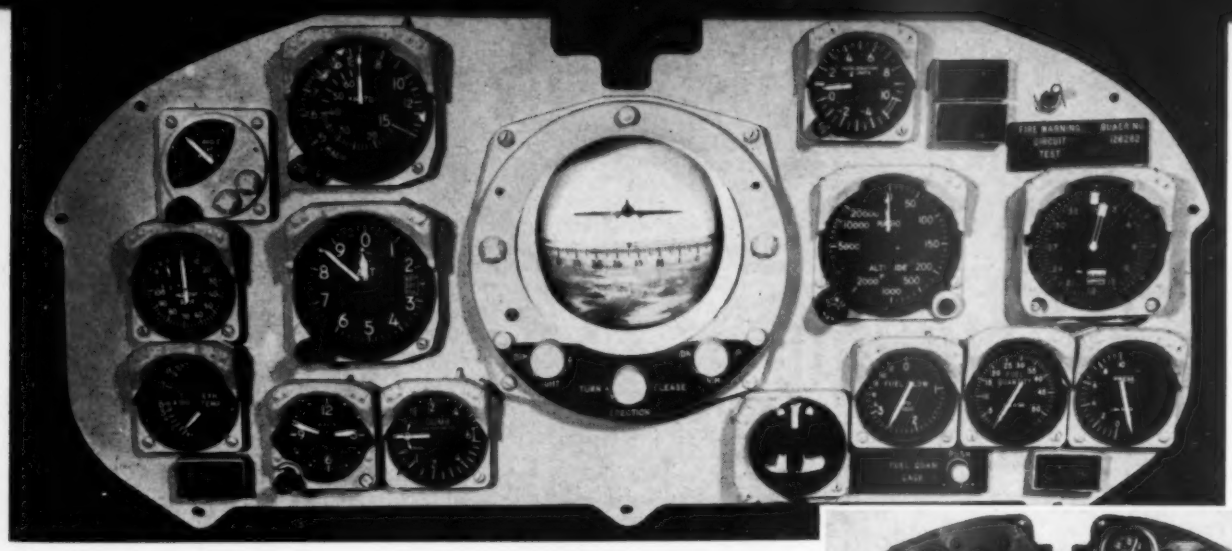


MORE INFORMATION, more easily understood on new BuAer panel.

OLD PANEL has cluttered look.

INSTRUMENTATION SIMPLIFIED

BY WALTER A. KILRAIN

AIRCRAFT SPEEDS, weights, and horsepower ratings continue to climb, but the man in the cockpit has gone through no modification program. In an attempt to help the pilot cope with the mass of information he needs in order to fly today's airplanes, the search for simpler instrumentation has long been under way. Latest effort to bear fruit is the Navy's. From its success may spring a series of innovations that will radically change the airplane's instrument panel as it appears today.

Two years ago the Navy's Bureau of Aeronautics set up an Interim Instrumentation Program. Early this fall, flight tests began on the first "hardware" to result from that program: a new instrument panel installed in a Grumman F9F-6 Cougar and a Lockheed TV-2 trainer.

Into the panel are packed a half-dozen innovations, including four basically new instruments, a redesigned altimeter (a counter and a single pointer), and a new type of warning signal. Among the new instruments:

• **A Mach meter** combined with the airspeed indicator.

• **An angle-of-attack indicator** with readings corrected to show the angle of the entire airframe, as distinguished from merely local readings.

• **A dead-reckoning bearing-and-distance meter** designed for use without reference to any ground signals during long flights over water. It can also be adapted for use with OMNI-DME signals when those are available. The instrument combines the information that would be presented by OMNI and DME TACAN.

• **A combined attitude and direction indicator** in the center of the panel, with a landscape painted on its moving background, to give a realistic impression of mass motion with the movements of the symbolic airplane. In addition to indications of pitch, roll, and turn, the instrument includes compass bearings, thus combining functions of gyro horizon and stabilized compass.

• **Legend-type warning panels** replace the standard red light buttons. On these new rectangular indicators, words light up to specify the danger: FIRE FORE, FIRE AFT, OF LOW FUEL QUANTITY.

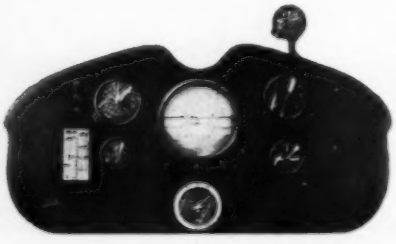
For all these instruments, and for those still in conventional form, a new integral lighting system is under study. In this system, the lighting, built into the basic instrument design instead of added as an accessory, comes from within the instrument case. The dial is reported to be almost as easy to read at night as it is in the daytime. At present only the angle-of-attack meter and the attitude-direction indicator are equipped with it.

• **Object of BuAer's program:** "To make the instruments simple enough so that they can be read by a 14-year-old instead of a Ph.D.," in the words of Capt. J. E. Sullivan, director of the Airborne Equipment Division. In pushing toward this goal Sullivan coordinates the work of instrument companies as well as Navy pilots, human engineers, and mechanical engineers.

Sullivan believes the interim program to have been one of the first set up by any of the armed services to study

AIRSPEED is indicated in both knots and Mach numbers.

COMING UP: Sketch shows BuAer's thinking—combination instruments and possible return to vertical gauges.



NEW ALTIMETER has both pointer and counter.

the information requirements of aircrews and how they can best be met. The program is directed not only toward pilot instrument panels but also toward armament and radar systems.

When does the interim end? At present a long-range, highly classified instrumentation program is being pursued jointly by BuAer and by the Office of Naval Research, reportedly with the help of the Douglas Aircraft Co. In four or five years this program and the interim BuAer one are scheduled to merge.

Meanwhile, the simplification of instrument panels will move through a series of stages. Some of the unclassified developments now planned are shown in the accompanying artists' sketches. They represent the design changes which BuAer hopes will make the job of reading a large number of instruments at high speed an easier one.

Keys to the design trends being considered are combination of two or more instruments into one, whenever possible; wide use of symbols and pictures; and return to vertical gauges (*resembling thermometers*) instead of circular dials. These last used to be more difficult to manufacture than the dial types, and less efficient in operation, but advances in technology since then have brought them back into consideration.

How successful these design ideas will prove to be remains to be seen. The goal—fewer instruments, easier to read—is clear, but the best way of reaching it is a question which will occupy the members of the interim program for the next several years. The new altimeter, with a counter-and-pointer combination instead of the confusing three pointers that have been standard in the past, is in pilot line production. The airspeed-Mach meter and angle-of-attack indicator are in full production. Several other varieties of the attitude-direction indicator will be tried before it is ordered in any quantity.

Thus far the F9F-6 and the TV-2 with the new panel in its front cockpit have been undergoing preliminary flight tests. By the middle of this month these tests should be over and the planes will spend the following six months being wrung out by green pilots in training units. The results should indicate how close BuAer has come to its goal of modifying the jet world to fit the men who must fly in it.

ACC Organization Changes Approved

The Air Coordinating Committee has approved with only minor language changes some 40 to 50 Budget Bureau recommendations on its internal organization. Although full details were not released at presstime, one suggestion reportedly would make the Federal Communications Commission a member of ACC. Another recommendation would change the "tone and emphasis" in ACC's charter by issuance of a new executive order updating that which established the agency in 1946.

Now! BENDIX·SCINFLEX waterproof plugs

for use with multi-conductor cables

These new Bendix*-Scinflex *waterproof* plugs are a modification of our standard AN type "E" (environment resistant) connector. They are designed to meet all "E" performance requirements when used with multi-conductor cables. Each plug includes a modified AN3057B cable clamp which provides inward radial compression on multi-conductor cables. This unique feature completely eliminates cable strain—a common source of circuit trouble.

In addition, there are gaskets at all mating surfaces and an accessory sleeve is available to accommodate an extreme range of cable sizes. A folder describing this new waterproof plug—and the various sizes in which it is manufactured—may be obtained by writing our Sales Department.

THESE BUILT-IN FEATURES ASSURE TOP PROTECTION AGAINST CIRCUIT FAILURE

Shock and Vibration Resistant

Die Cast Aluminum Shell

Cadmium Plate—Olive Drab Finish

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High Arc Resistance,

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Circle No. 13 on Reader Service Card.

Cessna Ready to Produce CH-1 When It Gets Certification

ALTHOUGH President Dwane Wallace would probably never admit it, prospects are better than ever that Cessna Aircraft Co. will set a record in new model development this year if it enters production with its CH-1 light helicopter.

With only CAA flight performance certification testing still to be hurdled, (and this will start this month or next) Cessna will have cut the customary four to five year span from design inception to production of a new helicopter model to less than three years.

Since acquiring the Seibel Helicopter Co. and beginning development of the CH-1 in mid-1952 Cessna Aircraft has:

• **Completed wind tunnel testing** with a quarter-scale model of the CH-1 fuselage to arrive at a final streamlined low-drag design.

• **Built and flown** a test bed "skeleton" version for 200 hours to prove out its drive and control system and flight characteristics. First flight was made in July 1953.

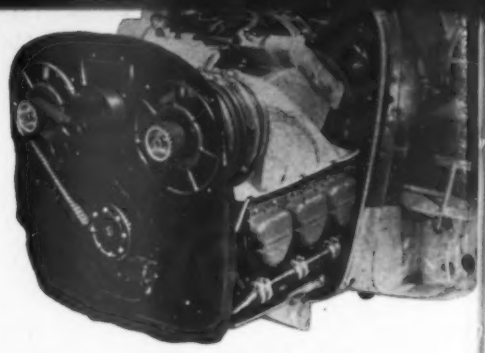
• **Produced two** pre-production CH-1 prototypes. The first, which began flying in July 1954, has logged close to 75 hours. The second made its first free flight on Nov. 16.

Until the remaining CAA flight tests are completed and the CH-1 is certified, Cessna officials just won't talk specifics of production plans, performances, or design details. Expectations are, however, that the 3000-pound gross helicopter will cruise at better than 100 mph and that its 260 net hp supercharged Continental FSO-470 engine will permit it to hover at altitudes close to 10,000 feet. Useful load will be about 1100 pounds, and this, combined with ample cabin space, will allow up to 4-place seating.

However, Cessna is not banking on performance alone to sell the CH-1. Unique in its design are these features, cited by helicopter division manager Jack Leonard:

• **Engine Accessibility**—Engine is mounted forward of the crew compartment in the normal horizontal position for which it was designed. With this arrangement, Cessna not only expects better engine operation, but feels it has really accomplished something in improved accessibility. Simple removal of the cowling gives immediate access for routine servicing. Engine change becomes a short-time operation.

• **Optimum Load Distribution**—This engine mounting, combined with strategic location of fuel cells and other aircraft accessories, has brought the removable load as close to the center of gravity as possible. Thus the helicopter is virtually free of problems of excessive cg travel with changing load conditions (*this eliminates the need for such measures as providing movable accessories to compensate for varying load conditions.*)



CH-1 ENGINE is mounted front and horizontal for ease of maintenance and best performance.

• **Design Simplicity**—Most impressive design feature of the CH-1 is the simplicity of its main and tail rotor drive system. This Cessna considers a big step toward combating transmission problems, which the military services now rate as the No. 1 helicopter trouble spot.

• **Best examples** of this simplicity are the scarcity of gears in the rotor drive system (only five are used throughout, three in the main and two in the tail rotor transmission) and the attach angle principle of rotor suspension. Such trouble spots as blade retainer bearings are eliminated and an improved version of the Seibel attach angle, consisting of a stack of four stainless steel sheets, supports each main rotor blade and continually flexes as both collective and cyclic pitch is changed. • • •

PRELIMINARY SPECIFICATIONS
CESSNA CH-1

Type—All-metal, 2-4 place
Gross Weight—3000 lbs.
Empty Weight—1900 lbs.
Useful Load—1100 lbs.
Cruising Speed—100 mph plus
Hovering Ceiling—9-10,000 ft.
Dimensions—42.5 ft. long, 9 ft. high
Engine—
260 net hp Continental FSO-470
Fuel Capacity—60 gals.
Main Rotor—2-blade, 35 ft. dia.
Blades—Prewitt stainless steel
Tail Rotor—7 ft. dia.

CESSNA'S LEONARD (left) with pilot Zimmerman and the CH-1. Inset shows simple "attach angle" rotor suspension

Beating the Airline Cost Spiral: Two Methods with the Same Result

BY JOSEPH S. MURPHY

IN THE FACE of a general airline trend during 1954 in which expenses outgained revenues, two carriers are showing real results with major cost control efforts.

The two are Braniff Airways and Trans World Airlines, and their success in cutting costs is expressed in their financial reports for the first three quarters. They read like this:

• **Braniff**—Net income after taxes, $2,000,661 compared to a loss of $1019 for the same period in 1953. While total revenues jumped from $29.2 million last year to $34 million, expenses have been cut from $30.9 million to $30.7 million.

• **Trans World**—Net earnings of $9,031,000 compares to $6,210,000 in 1953, a 45% increase, while total sales have only risen 10% from $142 million to $156 million.

In contrast, operating revenues of the combined U.S. carriers rose 9.1% from $669 million to $729 million during this same period as expenses were climbing 11.8% from $592 million to $662 million.

Although the results realized by both Braniff and TWA are similar, the circumstances in each case have been quite different. Here's how they went about it.

Braniff's financial recovery is virtually inseparable from its reorganization. Actually, Braniff embarked on its program of cutting cost in October 1953, but it was hardly under way when the tragic death of President T. E. Braniff in January 1954 threatened to alter the picture completely.

At that time the airline was already on file with CAB for restoration of some part of the local service subsidy paid to Mid-Continent Airlines before the merger but soon after cancelled by the board. Also, suspension of service at seven low-traffic points was in the mill as part of an overall route improvement program.

Added to these, new inventory control methods had been introduced and Braniff had launched an all-out drive to better its on-time performance with goals set at unprecedented levels.

But Braniff's recovery program, instead of faltering under the sudden loss of its founder and president, gained new impetus. What happened in the ensuing months stands both as credit to its late president for the supporting organization he had built and as proof that the "team management" that succeeded him really works.

• **Within three days**—C. E. Beard was named president and J. W. Miller (a former airline president before the MCA-BNF merger) executive vice president. Oklahoma business executive Fred Jones was made board chairman. T. F. Ryan was named executive committee chairman, and a new finance committee was formed under chairman Ferdinand Eberstat. Bolstering the stature of this latter group was T. E. Braniff's close friend, W. A. Blakley, successful banker, rancher, insurance and oil man.

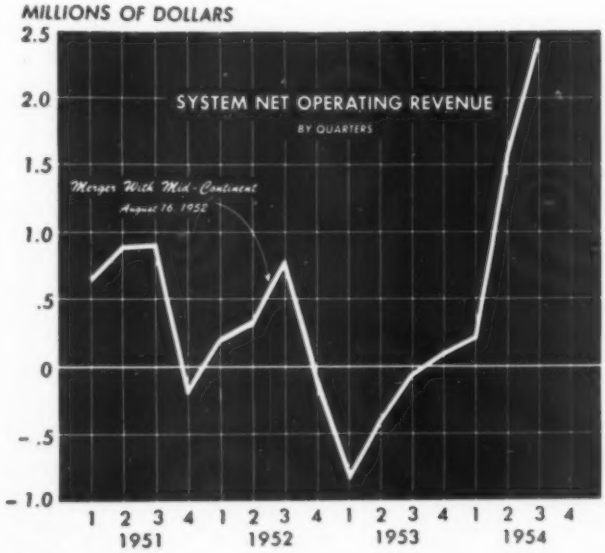
• **Only a month later**—Braniff's administration was decentralized and five new vice presidents were named. All became members of a new management advisory committee under Beard and Miller.

True, the improvement in Braniff's nine month report cannot entirely be attributed to improved cost control nor, for that matter, to its new management. Of its $2 million net income possibly as much as $250,000 results directly from added revenues during the American Airlines pilot strike. This, combined with an increased local service mail rate awarded by CAB retroactive to January 1 and $774,572 in nonrecurring capital gains, brings its "improvement" profit down to something like $530,000.

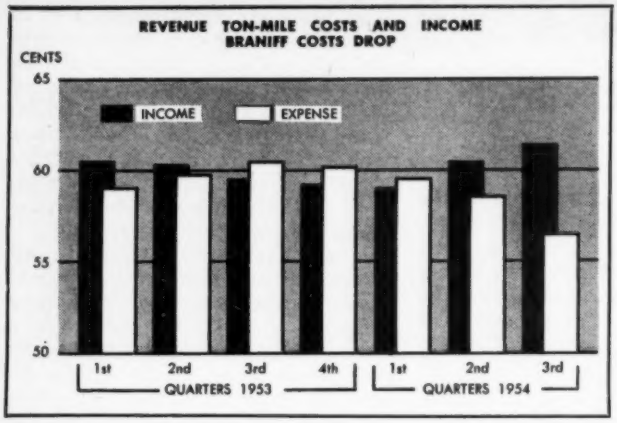
But even at that figure the Braniff effort represents a marked advance. For the same period in 1953, without considering these non-recurring items, the airline lost $1,745,978—a net improvement of $2,275,000 within 12 months. And this, says president Beard, includes only the first nine months of 1954 "with the best three months still to come."

Significant in BNF's new mail rate is a $208,000 saving from that paid Mid-Continent before the merger. But even aside from this relief from CAB, Braniff has been able to increase its

BRANIFF'S comparison of System Operating Revenues versus Operating Expenses shows that rigid control of operating expenses began to show results during the latter part of 1953 and continues through to the present.



BRANIFF'S MERGER with Mid-Continent and elimination of "subsidy" mail pay on former Mid-Continent routes brought about operating losses until the quarter ending Dec. 31, 1953, when Braniff operations again became profitable.



AVAILABLE TON-MILE COSTS
TWA REVERSES A TREND

Here's how TWA's costs per available ton-mile rose from 1950 to 1953 and how the airline was able to reverse the trend last year:

	Change 1950-53	Decrease 1953-54
Flying operations	+0.4¢	0.5¢
Direct maintenance	none	0.9
Depreciation—flight equipment	+0.1	0.9
Ground operations	+1.1	1.1
Ground and indirect maintenance	—0.2	0.4
Passenger service	+0.4	0.1
Traffic & sales	+2.6	0.3
Advertising & publicity	+0.6	0.6
General administrative	+0.1	0.4
Depreciation—ground equipment	—0.2	none
Total change	+4.9¢	—5.1¢

non-mail revenue during 1954 by $3,385,000 while cutting expenses.

Here's how the new team management has brought Braniff to its present position:

• **Increased Productivity** — Decentralization of responsibility has fostered a new budget consciousness throughout the organization. While total employment has dropped 5% from 4092 to 3886 since September 1953, revenue produced per employee has increased almost 9%.

• **Inventory Control**—Management keeps right on top of inventory costs and trends via a new IBM system of record keeping adopted a year ago. To date total inventory has been cut better than $1 million from $4,109,643 to $3,075,806 —a 25% reduction. BNF officials look ahead to another $500,000 saving from this source.

• **On-Time Performance**—Aiming at the almost impossible goal of operating 75% of departures "on the minute" and 90% within 15 minutes of schedule, BNF's v. p.-operations, R. V. Carleton, shows some remarkable results. As one of the best examples he points to the record for November 1954 when 70.7% of flights operated exactly on time and 88.1% within 15 minutes.

• **Better Budgeting**—Budgets at Braniff start at the first line of supervision up through department heads to budget director R. L. Barrier, then to a budget committee. Forecasts are kept 12 months ahead by quarters, and a monthly comparison of forecasts and results is given all department heads for review with all levels of supervision.

Good employee morale has played a key role at Braniff throughout the program and president Beard aims to keep it that way. Since assuming that post in January he has visited every one of BNF's 61 domestic offices and only recently completed a similar tour of its international operation.

Beard's other approach is to keep the employee informed of what management is doing, and on three occasions since April he has personally "reported" to them. Addressing the bulk of BNF's roster at Dallas, a telephone hook-up carried the message to such spots as Kansas City, Chicago and San Antonio. Recordings are made for smaller stations throughout the system.

Examples of employee support behind the new management are many. In its maintenance and overhaul shop, director J. R. Horton says voluntary employee response with time-saving ideas alone has cut costs $77,000 a month. Malcolm Harris, v. p.-personnel, credits the terrific teamwork of employees, representing both company and labor unions, for finally uniting each of the six pairs of contracts with which Braniff has operated since the Mid-Continent merger.

At TWA there has been no reorganization. Instead there has been a general "tightening of the belt" that has seen it reduce total employment by about 1000 in a way that has involved only one minor layoff. For the most part the cut has been accomplished by not filling vacancies as they occur.

Says President Ralph Damon, "The biggest thing in cost control is the ability to say 'no.'" And in TWA there is little doubt that the current effort stems directly from Damon and that he and his department heads right on down to the supervisor have learned to say "no."

When vacancies occur they aren't filled unless it can be proven a department's work will otherwise suffer. And most of the time it has been found that fewer people can do the work. A good example is TWA's operations department which usually represents about 75% of its total head count. While employment here dropped 18% between Jan. 1 and June 30, 1954, available ton-miles were being increased 6%. Productivity per employee jumped from 10,674 to 11,864 ton-miles.

These are some of the steps that made it possible:

• **More realistic scheduling.** TWA found a tendency of actual flight times to follow whatever the timetable called for and its experts in flight, maintenance, meteorology, and stores put their heads together to arrive at the fastest realistic schedule possible. As a result, a standing order to pilots that flights

TRUNK AIRLINES COMPARISON OF REVENUE TON-MILE COSTS AND INCOME

Table below shows 12-month moving averages by calendar quarters of income and expense per revenue ton-mile for the various trunk airlines. The moving average, the sum of each four successive quarters divided by four, was used to eliminate differences of fiscal year accounting, even though seasonal fluctuations are less apparent.

	1953								1954					
	1st Quarter		2d Quarter		3d Quarter		4th Quarter		1st Quarter		2d Quarter		3d Quarter	
	Income	Cost	Income	Cost	Income	Cost	Income	Cost	Income	Cost	Income	Cost	Income	Cost
AA	.527	.448	.527	.445	.522	.447	.518	.448	.515	.456	.516	.461	.515	.482
BNF	.606	.590	.603	.598	.596	.605	.593	.601	.591	.596	.605	.585	.615	.564
CAP	.584	.542	.587	.539	.586	.539	.585	.545	.580	.548	.575	.554	.575	.552
CAI	.806	.803	.781	.746	.765	.732	.705	.709	.707	.728	.710	.739	.726	.740
CAL	.696	.649	.695	.649	.698	.655	.698	.668	.700	.668	.702	.665	.692	.653
DAL	.558	.486	.560	.504	.562	.523	.566	.537	.569	.546	.571	.535	.570	.525
EAL	.526	.452	.527	.452	.527	.459	.526	.472	.524	.473	.519	.470	.512	.461
NAL	.494	.416	.492	.412	.486	.409	.481	.413	.484	.431	.488	.440	.492	.449
NEA	.858	.875	.916	.882	.924	.879	.956	.908	.985	.926	.952	.930	.935	.918
NWA	.549	.559	.554	.541	.552	.535	.551	.523	.550	.528	.544	.528	.537	.511
TWA	.523	.459	.519	.456	.511	.452	.504	.464	.500	.470	.495	.465	.492	.443
UAL	.533	.445	.534	.448	.532	.455	.529	.461	.526	.472	.522	.475	.521	.465
WAL	.588	.500	.591	.515	.594	.519	.590	.523	.586	.527	.579	.532	.574	.525

should not arrive more than 15 minutes early was scrapped. Operating procedures were changed so that maximum authorized cruise power is used at all times regardless of favorable winds that might have previously called for a power reduction to stay on schedule.

The result has been a general speed-up of TWA's station to station segment operation. And this "time consciousness" has extended into station operations to produce a 50% improvement in ground handling time over previous experience.

• **Materials Cost Surveillance**—A salvage committee of top engineering, maintenance, and stores supervisors was set up to screen all scrap material each week for possible repair or modification for re-use. A companion "big-payoff" program was started to give mechanics and engineers the chance to help eliminate high-cost problems, with the incentive of a monetary reward to those who contribute acceptable solutions paid through the company's suggestion plan.

In the first nine months since this project started TWA estimates savings of several hundred thousand dollars.

• **New Inspection System**—Early last year TWA adopted the "balanced" maintenance check system where routine aircraft inspections of almost equal workload and out of service time are planned for the entire 2500-hour period while an aircraft is away from the overhaul base. Instead of the old recurring No. 1-2-3 system, checks are repeated every 100 hours with inspection work systematically planned and varied from one operation to another to get the most efficiency.

Since this change went into effect the number of aircraft inspections has increased by 5.7%, but the personnel needed to do the added work has dropped more than 6%. Also, with the better planning under the new system, the average number of man-hours needed per inspection has dropped slightly more than 20%.

Although these specific changes tell only how TWA operations responded to the cost control effort, similar steps in other areas have brought improvement in virtually every category of expense.

• • •

Lodair Begins Test

The year-long experiment with the Whiting Loadair installation at New York International Airport got underway earlier this month. Being underwritten by the Whiting Corporation, the first U.S. test of the equipment is being carried out in cooperation with American Airlines and The Port of New York Authority.

The $90,000 installation includes loading docks and a two-story house-type structure for boarding passengers and baggage.

People

Manufacturing

Northrop Aircraft has created a missile project staff, composed of divisional representatives, to coordinate all missile activities within the company and be responsible for initiating new policies or procedures in missile development. Heading the staff is **C. Hart Miller,** who recently joined the company as executive assistant to John W. Myers, vice president-customer relations. Other members include: **E. Herdrich,** assistant director; **Don Cavanaugh,** customer relations; **Morwick Ross,** administration; **C. J. Dunn,** engineering; **W. J. Vander Schans,** manufacturing; **O. E. Sharnborg,** finance.

MILLER

NAGEY

DROGE

KNUDSEN

The Glenn L. Martin Co. has set up a separate Nuclear Division for the development of nuclear power equipment. Headed by **Tibor F. Nagey** as manager, division will consist of a manufacturing section and a nuclear laboratory. **Dr. Robert Spooner** was named manager of nuclear research and development, and **James Dunlop** was named manager of nuclear manufacturing. Others in the new division: **William A. Maxwell,** head of nuclear production engineering; **Howard F. Dunlap,** mgr.-nuclear products development; and **Russel L. Hopping,** in charge of marketing research.

Arthur J. Droge, formerly staff engineer with CAA, appointed ass't sales mgr. for Greer Hydraulics.

Laurance H. Cooper, formerly gen. mgr. of the Aircraft Div., Rheem Manufacturing Co., elected president of Hall Scott Motors Co.

Allen D. Marshall appointed v. p.-management planning and secretary of General Dynamics Corp., from mgr. of employee benefits.

S. E. Knudsen, formerly ass't manufacturing mgr. for aircraft engine operations, Allison Div., General Motors Corp., succeeding J. C. Cunningham, retired, as mgr.

Reagan C. Stunkel appointed v. p. in charge of Hydro-Aire's new Electronics Div., from v. p.-operations. **Robert J. Trivison** is the new division's works manager.

Richard T. Myer, formerly chief metallurgist at the Massena Works of The Aluminum Co. of America, appointed chief metallurgist of the Aluminum Fabrication Div., Kaiser Aluminum & Chemical Corp.

William Bailey, formerly an airline consultant in Washington, joined The Glenn L. Martin Co.'s advance design dept., as an economist.

Leonard D. Sullivan appointed v.p. sales of Babb Co., Inc., and its subsidiaries.

At Chance Vought Aircraft, **Fred N. Dickerman** has moved up from chief engineer to director of engineering and **Raymond C. Blaylock** has been promoted from assistant to chief engineer.

C. B. Wright named chief engineer of aircraft engineering and **J. R. May** named chief engineer of commercial and administrative engineering in the aeroproducts operations of Allison Div.

Donald K. Miner, formerly with General Electric Aircraft Gas Turbine Div., and **J. David Benedict** have transferred as engineers to the vacuum-melted alloys section of G-E's Carboloy Dept.

Kermit F. Wasmuth appointed director of quality control for Republic Aviation Corp., from quality control mgr. for Boeing-Wichita.

Airlines

M. E. A. L. de Jong appointed advisor to management on world-wide traffic and sales matters for KLM Royal Dutch Airlines from gen. mgr. for the United States. **P. O. Eden,** formerly regional mgr. in New York, succeeds de Jong as traffic and sales mgr. in the U. S.

George L. Wertenbaker returned to Capital Airlines as ass't to v. p.-traffic and sales from a tour of duty with the Air Force.

Albert C. Meyer named mgr. of Air France's tour dept.

Amos Culbert, fomer v. p.-sales for Northwest Airlines, appointed special advisor on sales and operations by North Central Airlines.

W. Arnold Andrew named ass't mgr. of overseas lines for Canadian Pacific Airlines from ass't director of flight operations.

Harold F. Hammond, mgr. of the Transportation and Communication Dept., Chamber of Commerce of the United States, becomes exec. v. p. of the Transportation Association of America, Jan. 15.

Max King reinstated as v. p.-public relations for Southwest Airways after withdrawal of his resignation.

Ray M. Wilson, a founder of one of Frontier Airlines' predecessor companies, Monarch Airlines, has left FAL where he was v. p.-operations.

original contract for 25 of the aircraft for finishing assembly of the Britannia,

BRITAIN PAYS THE PENALTY FOR BEING FIRST

• Bristol and de Havilland face new Technical Requirements for Britannia and Comets

BY ANTHONY VANDYK

BRITANNIA: When will it enter service?

TWO of Britain's largest aircraft manufacturers are entering 1955 with an air of grim determination. At the back of every de Havilland executive's mind is the uncertainty as to whether airlines will renew their contracts to buy Comets. At Bristol there is increasing concern about the lack of orders for the Britannia.

Both companies are aware that their position is made no easier by the fact that their U. S. competitors—late starters in the turbine transport race—are coming along fast while events of the last 12 months have seriously affected Britain's position in the long-haul field.

The uncertainty about the future on the British long-haul transport scene is largely connected with new, very rigorous certification requirements by the Air Registration Board and their implications. The ARB now requires that manufacturers of high-altitude transports supply a production aircraft for pressurization fatigue testing in the Royal Aircraft Establishment's tank at Farnborough in addition to a normal test specimen. Also required is a greatly increased flight test program including operation on proposed routes with vertical gust recorders and other recording instruments.

It is also likely that ARB will insist on future high-altitude transport detail designs avoiding stress raisers (square openings will give place to round or oval; cut-outs will be more heavily reinforced; etc.). ARB will also want pressure shells to be manufactured to the highest standards with no plant processes used that might be conducive to cracking (*drop hammering is such a process*). These ARB requirements will greatly increase development costs of new transports and will raise prices.

• **To meet** the new ARB requirements de Havilland has formulated an extensive modification program for the Comet 2 and 3 designs, including reskinning the fuselage with thicker gauge *(0.040 inch instead of 0.028 inch, and in places 0.036 inch)*, fitting of thicker reinforcing plates at cut-outs, and deletion of rectangular windows and hatches. The fuel system venting is to be changed to avoid danger of vapor filling the wing in the neighborhood of wiring during climb. The pressure fuel system will be altered to prevent pressure build-up damaging the structure. The rear fuselage is to be stiffened against jet efflux buffeting (which would eventually cause fatigue failures) and the wing will be modified near the wheel well where Farnborough tests revealed low fatigue life.

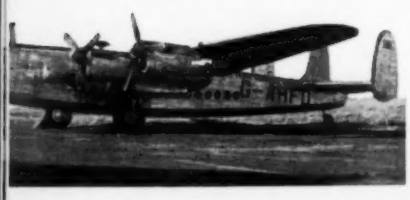
A more simple and relatively inexpensive set of modifications has been proposed for the eight completed, or nearly completed, Comet 2's. These include riveting doubler panels and plates over the skin along the line of the windows and around all doors and hatches. Heavy gauge plate *(about one-tenth inch thick)* will be used to reinforce the skin over the wheel bays in the wing. The total weight increase is estimated at less than 1000 pounds and this can be largely offset by the improved output from the Avon RA25—7100 pounds static thrust.

The eight modified Comet 2's are likely to go to the RAF Transport Command to form Britain's first military jet transport squadron. A similar modification program could be made to the remaining Comet 1 and 1A aircraft *(belonging to BOAC, Air France, UAT-Aeromaritime, and the RCAF)*. Since the two French operators are reportedly demanding compensation and refusing to complete their deals on later-model Comets until "money is refunded," their aircraft are likely to return to England. Most British observers see the best way of getting some return for public money *(it is generally agreed that the government must help out de Havilland)* is to use the Comet 1's and 1A's as tankers for the RAF—probably unpressurized or at reduced differential. This was proposed by BOAC even before the accidents as a way of disposing of the Comet 1 fleet when Mark 2 and 3 deliveries had made the initial model redundant.

• **Meanwhile, de Havilland** is canvassing airlines which have ordered the Comet 2 and 3 to place new contracts for modified versions of these aircraft *(most of the present contracts lapse if the planes are not delivered within six months of the promised dates)*. The company is telling these airlines that as a result of improvements to the Avon engine and to other features, the heavier weight which will result from fitting the fuselage with thicker-gauge skin will not result in any loss of payload or other performance penalty. In fact, de Havilland is claiming, the redesigned aircraft will have a better performance than that originally estimated.

While nine airlines have announced orders for the Comet 2 and 3, the Britannia still has only one customer—BOAC. The British nationalized airline recently declared that it "needs and believes in the Britannia" but at the same time pointed out that since signing its

CHECKERED CAREERS have been the order for the York (left), Tudor (center), and (right) the Hermes.



original contract for 25 of the aircraft in July 1949 "no individual Britannia aircraft has yet flown pressurized for more than a total of 120 hours" and that "the aggregate test flying time of all Britannias ever built does not exceed 600 hours, with the majority of this flying done unpressurized." The corporation says that "naturally, BOAC, in the light of Comet experience is demanding additional Britannia pressurized test-flying."

• **The contract delivery dates** for the 25 BOAC Brittanias were from May 1954 to Oct. 1955, but it now seems unlikely that any of the aircraft will be in passenger-carrying service before 1957. Meanwhile, the components for the fatigue-test Britannia test specimens are currently being sent to Farnborough. A new tank for the testing will be completed at the end of February. Thereafter six weeks will be required for finishing assembly of the Britannia, fitting it into the tank and applying the loading devices. Testing is due to start in mid-March and will continue until June or July.

The Britannia currently in production is powered by Proteus turboprop engines. Because its speed is slower than that of the turbo compound-powered DC-7C which will enter passenger-carrying service early next year, the sales prospects for the Proteus-Britannia are limited. The projected version with the BE25 engine (AMERICAN AVIATION, Dec. 6) is a different matter. From all indications this will be a highly competitive aircraft with unmatched performance in its category.

Nevertheless, as BOAC chairman Sir Miles Thomas says: "You cannot carry passengers on promises." He points out that while the British airline corporation has a firm policy of buying British whenever possible, it has also the statutory responsibility to operate an airline. "To do this," he says, "we must have the right aircraft. Moreover, it is essential that we should have them at the right time if we are not to lose trade to the airlines of other nations."

• **The background** to Sir Miles' words is BOAC's experience with British aircraft since the war. There have been troubles of one sort or another—late delivery, "bugs," poor economics, unexplained accidents— with every one of the British models used commercially by the corporation—Lancastrian, York, Tudor, Solent, Hermes, and Comet. It has been unfortunate for BOAC that the corporation has no routes suitable for successful postwar British transports such as the Dove, Viking, Heron, Ambassador, Bristol 170 and Viscount.

Comet 1's: To the RAF?

With the "black year" of 1954 behind it, the British aircraft industry is now desperately seeking to regain the confidence its long-haul turbine transports held prior to the beginning of last year. Its all-out attempt to learn the lessons of the past 12 months and to incorporate them into both present and future designs merits more than passing recognition. By building the experience of yesterday into the long-haul transports of tomorrow (*Vickers 1000/1003, BE25 Britannia, and "Comet 4"*) the British aircraft industry may yet achieve its long-cherished goal of having its products flying on the major air trade routes of the world. • • •

Comet 3's will be offered to airlines in a modified, strengthened form.

New Defense Rules Aim To Help Small Concerns

In an effort to assure small business of "an equitable opportunity to compete" for defense contracts, the Defense Department recently issued a revised directive on defense small business policy.

Directive No. 4100.10, dated Dec. 16, 1954, was written "to establish a more comprehensive and more effective" small business program. It notes that "a fair proportion of the total purchases and contracts for supplies and services . . . shall be placed with small business concerns, whether as prime contractors, subcontractors, or suppliers."

The directive spells out a number of general and specific policies regarding the Defense Department's dealings with small business, and also assigns Thomas P. Pike, Assistant Defense Secretary (Supply and Logistics) responsibility for all defense procurement policies in the small business category.

Effective 30 days after issue date, it also notes that a Defense Department instruction will be issued on the implementation of small business policy with respect to defense subcontracts.

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100-Hour Inspection for Non-Carriers Urged to Replace Annual Check

BY LOIS C. PHILMUS

A PROPOSED rule which would eliminate the CAA annual airworthiness inspection for civil non-carrier aircraft is being drafted by CAB, to be circulated soon for industry comment. Based on CAA recommendations, the new regulation would substitute a mandatory inspection every 100 hours. An alternative, aimed particularly at business aircraft fleet operators, would be progressive inspection.

Previously, regulations had required one periodic check per year for non-carrier aircraft which would be accomplished during the annual. Non-carrier aircraft for hire were subject to a 100-hour check plus the annual inspection. The new regulation, if adopted, would omit the distinction.

The 100-hour check proposal was based on a CAA survey which found that over two-thirds of the active civil aircraft are two-placers, flying an average of 127 hours annually. The remaining one-third averages 238 hours. It was found that the majority of the owners and operators already use the 100-hour check voluntarily. The result of the proposed regulation would probably be three checks every two years, on the average, instead of the one per year. In some cases it would go higher.

• **The system set up** for the 100-hour inspection progressive maintenance alternative will relieve CAA of the responsibility for airworthiness, putting the burden wholly on the mechanic and plane owner. To accomplish this, CAA will grant "Inspector's Authorizations" to qualified, licensed A&E's. With the issuance of IA's, CAA will phase out the DAMI (Designated Aircraft Mechanic Inspector) category. Fleet operators, electing to use the progressive inspection system, will be required to utilize the services of CAA-certificated repair stations. If a fleet operator maintains its own maintenance facilities and mechanics, it would have to apply for a limited repair station rating, which would allow the facility to do the progressive check on the equipment it is qualified to handle.

(There are currently 374 repair stations holding CAA certificates with 190 of the total qualified to do the inspection because of holding an airframe rating.)

The main difference between the present DAMI and the proposed IA classification is that the DAMI signs the airworthiness certificate on behalf of CAA. The IA will sign on his own behalf. Mechanics holding current DAMI certificates will automatically become IA's. Other A&E's wishing to qualify for the new designation will have to prove that they have been actively engaged in aircraft and engine inspection for the previous year. These will have to take what George H. Weitz, chief of the general maintenance branch of CAA describes as a "real tough examination." It will not be the typical A&E certification exam. It will include an information probe on what the applicant knows about inspection procedures, specifications, etc.

• **When the applicant** passes the exam, he is certified for one year. Thereafter, about every March, he will be required to attend general safety meetings in areas where district safety offices are set up. Here he must show that he has done a minimum of two 100-hour inspections per month for the year. If he meets this obligation, his certificate will be renewed. If he fails to show up at the meeting and wishes his certificate renewed, he will have to retake the examination.

The annual meeting will also give safety agents a chance to bring inspectors up-to-date on national and local safety and maintenance developments.

To make sure that aircraft operators follow the 100-hour check requirement, CAA is thinking of putting its safety agents on spot-check surveillance around the airports. Possibility of a windshield sticker has been discussed. Offenders would be "heavily penalized," Weitz points out, adding that it is usually a small minority which ignores safety requirements.

In addition, mechanics will be required to file a report with the local district safety office after completing a 100-hour check. The report will state whether or not the aircraft was found to be airworthy and, if not, a list of discrepancies must be attached.

• **To implement** the regulation, if adopted, CAA will call upon the newly formed National Aviation Maintenance Council (of the National Aviation Trades Association) to advise on strengthening Manual 18 by spelling out *accept* and *reject* standards of maintenance, which are not now contained therein. The council will also help in establishing enforcement policies.

The latter would be undertaken for a rather important reason. The DAMI's, in signing an airworthiness certificate on behalf of CAA, were relatively free from civil suits. The proposed IA's, signing for themselves, become liable.

• **If no legal snarls** are encountered the proposed rule will be a joint CAB-CAA release circulated for industry comment. Heretofore, such proposals were made by CAB and so adopted, and CAA would circulate the manual.

The new joint release will consist of the CAB proposal along with the details set forth by CAA.

The proposed rule making will call for revisions to Part 43 (operators inspection), Part 18 (inspection details), and Part 24 (designees). The proposal will probably allow 30 days for comment before adoption. Weitz feels that CAA will need "a 60-day breather after adoption" to begin implementation. • • •

SIMPLIFIED reporting will feature new procedures recommended by CAA to CAB. Below is proposed postcard form to be filled in by the inspector and filed in district safety office. For planes found not airworthy, a list of discrepancies is attached.

U. S. DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION

AIRCRAFT USE AND INSPECTION REPORT

REGISTRATION NO.	SERIAL NO.	AIRCRAFT MAKE	MODEL
N—			
NAME OF REGISTERED OWNER		ENGINE MAKE	MODEL
PERMANENT MAILING ADDRESS		AIRCRAFT TOTAL TIME IN SERVICE	HRS.
		TYPE OF INSPECTION *(Check one)*	
NO. AND STREET:		☐ PERIODIC	☐ PROGRESSIVE
CITY:			
COUNTY:		CONDITION OF AIRCRAFT *(Check one)*	
STATE:		☐ AIRWORTHY	☐ UNAIRWORTHY
PRIMARY USE OF AIRCRAFT		NAME OF INSPECTING AGENCY	
☐ BUSINESS *(Co., Corp., Partnership operated)*			
☐ BUSINESS *(Individual operated)*			
☐ PLEASURE ☐ INSTRUCTIONAL ☐ AIR TAXI		CERTIFICATE NO.	DATE OF INSPECTION
☐ AERIAL APPLICATION ☐ SURVEYING			
☐ OTHER		SIGNATURE	
AIRCRAFT TOTAL TIME IN SERVICE DURING LAST CALENDAR YEAR			
HRS			

30 CONSECUTIVE ISSUES

Sperry Gyroscope Co.
26 CONSECUTIVE ISSUES

McDonnell Aircraft Corp.
25 CONSECUTIVE ISSUES

Pioneer Parachute Co., Inc.
24 CONSECUTIVE ISSUES

Fairchild Aircraft Division
General Electric Co.
22 CONSECUTIVE ISSUES

Reeves Brothers, Inc.
21 CONSECUTIVE ISSUES

Flightex Fabrics, Inc.
Parker & Co.
Sinclair Refining Co.
18 CONSECUTIVE ISSUES

Goodyear Tire & Rubber Co.
17 CONSECUTIVE ISSUES

Elastic Stop Nut Corp. of America
16 CONSECUTIVE ISSUES

Michigan Seamless Tube Co.
15 CONSECUTIVE ISSUES

Eclipse-Pioneer Division
Paper Manufacturers Co.
14 CONSECUTIVE ISSUES

Aeroquip Corp.
Instrument Associates
Jack & Heintz, Inc.
Lavelle Aircraft Corp.
13 CONSECUTIVE ISSUES

The BG Corporation
Greer Hydraulics, Inc.
12 CONSECUTIVE ISSUES

Aero-Coupling Corp.
Electrical Engineering & Mfg. Corp.
Nutt-Shel Co.
Pesco Products Division
Pittsburgh Plate Glass Co.
11 CONSECUTIVE ISSUES

Air-Parts, Inc.
Aircraft Engine & Parts Corp.
Bendix International Division
Durham Aircraft Service, Inc.
Lear, Inc.
Rohr Aircraft Corp.
Titeflex, Inc.
10 CONSECUTIVE ISSUES

Air Associates, Inc.
Air Carrier Engine Service, Inc.
Bendix Products Division
Esso Aviation Products
Teco, Inc.
9 CONSECUTIVE ISSUES

The Aerotherm Corp.
Breeze Corporations, Inc.
Convair
Simmonds Aerocessories, Inc.
8 CONSECUTIVE ISSUES

Airwork Corp.
American Phenolic Corp.
Boots Aircraft Nut Corp.
Herman Nelson Division
The New York Air Brake Co.
Scintilla Division
F. W. Stewart Mfg. Corp.
Stratos Div., Fairchild
The Weatherhead Co.
7 CONSECUTIVE ISSUES

Philippine Air Lines
6 CONSECUTIVE ISSUES

Ace Products Co.
AiResearch Mfg. Co.
Aircraft-Radio-Marine Export, Inc.
Thomas A. Edison, Inc.
Foote Bros. Gear & Machine Corp.
Kollsman Instrument Corp.
Minneapolis-Honeywell Regulator Co.
Steel Products Engineering Co.
5 CONSECUTIVE ISSUES

Aerodex, Inc.
Aerosmith, Inc.
Hartman Electrical Mfg. Co.
L. B. S. Aircraft Corp.
Texas Metal and Mfg. Co.
Twin Coach Co.

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By William V. Henzey

$20 Million Subsidy Saving Likely If All Military Mail Goes Commercial

THE $20 million subsidy bill for U. S. airline service in the Pacific and Atlantic areas may be wiped out entirely in 1955 as a result of new CAB rate orders and a highly-significant top-level government decision to ship all overseas military mail via commercial airlines.

So great is the anticipated volume of so-called APO and FPO mail that, beginning on or about Jan. 1, 1955, both Pan American World Airways and Northwest Airlines will no longer need subsidy for trans-Pacific operations, CAB figures. On a lesser, but still significant scale, volume of military mail in the Atlantic will go up sufficiently to cut several millions from the subsidy bill of Pan Am and Trans World Airlines.

• **Coupled with** the military mail development is CAB's long-awaited decision in the Trans-Atlantic Final Mail Rate which, beginning with Jan. 1, 1954, cuts annual mail pay of TWA to a subsidy-free figure and reduces PAA to a maximum of about $2 million subsidy. If sufficient military mail volume develops, even the $2 million Pan Am figure would be wiped out.

At presstime, the Defense Department had not yet signed the document which would formally transfer the military mail from planes of Military Air Transport Service to the commercial carriers. But so confident were CAB and the Post Office, that service mail rate cuts were proposed on a temporary basis for carriers in the Atlantic and Pacific.

• **In the Pacific,** where Pan Am and NWA now get 60¢ per ton-mile in service mail pay, CAB proposed a Jan. 1 cut to 50¢. While this is in the nature of a rate concession to the government—the shipper of military mail—it is the interest of more volume and, consequently, more service mail pay.

CAB estimates the volume in the Pacific will increase three-fold to around 32 million ton-miles this year. At the 50¢ rate this would mean about $16 million additional mail pay for the carriers, or slightly more than current mail pay and subsidy combined.

• **In the Atlantic,** rates of TWA and Pan Am would be cut from 67¢ per ton-mile to 55¢ on Jan. 1 to accommodate the military mail. Volume of mail in this area would go up from about 13.8 million to 19 million ton-miles.

While the Atlantic military mail potential is not great enough in itself to wipe out the subsidy figure, CAB's decision in the Trans-Atlantic Rate apparently is. TWA, whose temporary Atlantic pay including subsidy has been averaging $8.5 million, has been cut retroactively to Jan. 1, 1954, to $4,281,000. This is $1 million under TWA's estimated subsidy alone and means that carrier will be getting service pay only.

Pan Am, whose temporary Atlantic pay averaged $13.5 million, will get $8,151,000 annually under the new board order, or less than $2 million under previously estimated service pay.

• **In the same decision,** CAB found that Pan Am's total mail pay for the period Jan. 1, 1946, through Dec. 31, 1953, should be $90,469,000, or $6.8 million more than actually received over that period by PAA. An additional back payment of $4,792,000 was included for operations of American Overseas Airlines prior to its absorption by Pan Am in 1950.

CAB emphasized, however, that the back payments to PAA and the recapture from TWA are subject to adjustment upon completion of a severed phase of the case dealing with so-called "offset issues" which is scheduled for hearings early in 1955. • • •

ABOUT TO BOARD a Lockheed T-33 jet trainer is CAB's flying member Joseph P. Adams (Col., USMCR) who recently completed the Senior Officers Jet Instrument Familiarization Course at Moody AFB, Valdosta, Ga. Course included 10 hours of jet flying.

Pending Cases

Hearings in the **Northeast-Southwest Service Case** closed on Dec. 15 after three months and one week during which a record 8000-page transcript was compiled, larger than in any previous new route case. Briefs to the examiner in the major route proceeding are due April 15; final decision likely in early 1956.

The **West Coast-Hawaii Case,** one of three pending Pacific area cases, reportedly went to the White House for final action on Dec. 10. Parties do not expect the President to act, however, until CAB submits its findings in the Trans-Pacific Renewal and States-Alaska cases.

Two weeks of hearings in New York in the **Eastern-Colonial Control Investigation** were completed Dec. 16 but a further session was scheduled for Washington beginning Dec. 29. Pending completion of this case, no action by interested airlines is expected on a merger for Colonial.

CAB Applications

Secretary of Agriculture Ezra Taft Benson asked CAB to sever for separate and early consideration the north-south phase of the All-Freight Renewal Case. Initial request for severance was made by Riddle Airlines which is also an applicant in the north-south phase.

American Airlines has moved for dismissal, denial, or public hearings on exemption requests of Slick and Flying Tigers for exemption to carry first class mail.

Recent CAB Decisions

Alaska Airlines and **Northern Consolidated Airlines** final mail rates reopened as of January 1, 1955, to reduce mail payments in light of recent profitable operations.

Braniff Airways denied permission to suspend operations at Sioux Falls, Fargo, Brookings, Watertown, and Norfolk (Nebr.); Member Lee dissented.

North Central Airlines authorized to serve International Falls, Minn., on year-around basis until September 30, 1955.

Delta-C&S Air Lines authority to suspend at Kingston, Jamaica, continued for additional year beyond Dec. 14, 1954.

CAB Calendar

Jan. 5—Hearing, Delta-C&S Air Lines Route Junction Case. Washington, D. C. Docket 6848.

Jan. 6—Oral argument, Ely, Nevada, Service Case. Washington, D. C. Docket 6528.

Jan. 10—Hearing, Skycoach Enforcement Case, Washington, D. C. Docket 6908.

Jan. 11—Oral argument, Chicago-Detroit Local Service Case. Washington, D. C. Docket 6411 et al.

Jan. 17—Hearing, Air Freight Renewal Case (east-west carriers). Washington, D. C. Docket 4770 et al.

Jan. 17—Hearing, Reopened Trans-Atlantic Final Mail Rate Case. Tentative. Docket 1706 et al.

Jan. 18—Hearing, Pan American-LACSA Control Case. Washington, D. C. Docket 6594.

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Airline Commentary

By Eric Bramley

WITH LITTLE FANFARE, Eastern Air Lines has launched a new food and beverage program of major proportions. We're informed that EAL intends to spend as much as $1 million more a year on food and is stating flatly that it is now serving "the most delicious meals in the air." *(Filet mignon is among the items we've seen on the new menus.)* Sales officers are informed of meal schedules 10 days in advance so reservationists can give prospective customers a sales pitch on what they'll have for dinner. Also available on first-class Constellations are scotch and bourbon highballs ($1), and martinis and manhattans (75¢).

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A SUCCESS STORY of a business built entirely on air transport is that of Airborne Perishables of Denver. From a small start six years ago, Dolph Anzick has built his company to the place where, in 1954, it shipped 575,000 pounds of rainbow trout, pheasants, smoked turkeys, etc., worth over $500,000. In the past six years Anzick has paid air express and air freight charges of $1.5 million. A tribute to the air service is the fact that his losses from delayed shipments, spoilage, misdirection, etc., have never exceeded one-half of 1% in any year.

• •

IMPORTANT CHANGE has been made in Air Traffic Conference by-laws. In the past, it took a majority vote to rescind an ATC action that had been in effect more than six months. Now an airline can signify its intention to withdraw, have the matter placed on the agenda at the next ATC meeting, and six months later it's out. We hear predictions that this will mean the death of the controversial reconfirmation rule within 18 months.

• •

ODDS AND ENDS: ATA directors gave final okay to $5000 expenditure for production of industry training film on baggage handling . . . PAN AMERICAN printed a few thousand copies of a novel 1955 calendar. Almost every month is printed in a different language (how do you read the numbers on the November page?) . . . MERLE SMITH, head of Cordova Airlines, Alaska, writes that last summer he flew 22 round trips to the top of Mt. Wrangell, landing at 14,000 feet altitude. Smitty didn't tell the purpose of the trips or the plane used.

Sales, Traffic, Promotion

Inter-airport helicopter transfer service in the New York metropolitan area for through passengers has been proposed by Northwest Airlines and New York Airways, without additional cost to the customer. Arrangement will become effective Jan. 5 if CAB approves. Service will be available to and from New York International Airport and LaGuardia, Newark, and White Plains, N. Y. Passengers will pay regular helicopter fares to other points on NYA's system . . .

Pan American World Airways during the past month has been engaged in what it calls the "biggest commercially sponsored airlift of civilians ever to operate from the U.S." PAA has been hauling 1518 men and women (International Harvester dealers and wives, winners in a company sales incentive contest) to a "house party" in Nassau.

SABENA has changed its name to **SABENA Belgian World Airlines** and will open new district sales offices in Philadelphia, Atlanta, and Cleveland, plus street-level offices in Los Angeles and San Francisco. Under the expansion program, personnel in U.S. will be increased by one-third in 1955 and budget for advertising and promotion in this country will be upped 30% . . .

Almost 25% of past passengers queried by Resort Airlines submitted names of friends who might want information on the company's all-expense air cruises. Resort notes that a 2% return on such direct-mail campaigns is considered good. From 2045 past passengers there were 498 replies, supplying an average of three names each . . .

REDESIGNED FORWARD COMPARTMENT has added almost a ton to cargo capacity of Pan American World Airways' DC-6B's. Removable partition gives access to the entire area through the 44-in. forward fuselage door. Formerly, part of the hold was loaded through 20-in. cockpit door, limiting size of packages. Installation of removable folding seats also enables space to be used for eight to 14 passengers.

American Airlines has offered to provide employees of other airlines, plus wives and minor dependent children, with unlimited half-fare privileges with positive reservations for personal and vacation travel. At last report, 42 carriers had accepted the plan on a reciprocal basis . . .

TWA has instituted for the sixth consecutive year its international exchange program to familiarize supervisory employees with company operations in the U.S. and overseas. A total of 29 overseas employees will visit the U.S. this winter while 336 will travel from the U.S. to Europe . . .

United Air Lines starts DC-7 service between Seattle-Tacoma and the midwest and east on Jan. 9 . . . **Continental Air Lines** was named 1954 winner of the Greater Denver Advertising Club citation, the Fame and Fortune Award, for outstanding advertising . . .

International Air Transport Association has accepted Pan American World Airways' proposal to reduce fares between Miami and Port au Prince and Ciudad Trujillo. Subject to governmental approval, 30-day round-trip Miami-Port au Prince will be $105, Miami-Ciudad Trujillo, $110, effective Apr. 1 . . .

North Central Airlines is now using a polyethylene folder for its seat pocket literature. Passengers are invited to keep the folders and use them to protect tickets, schedules and other papers when they fly . . . **Attractive new** Pan American folder features the company's "cargo reservation" plan . . .

Lake Central Airlines recently used an "apple give-away" promotion to point up advantages of using air express. Company had several crates of choice apples shipped from the state of Washington to Terre Haute and Bloomington, Ind., and Danville, Ill., three newest cities on its route. Stewardesses distributed the apples, packaged in cellophane bags printed with the information that the fruit was shipped only a few hours before from Washington . . .

New Sales Training Course for AA Agents

A new sales training course for reservations and ticket office agents has been launched by American Airlines. Although there have been other courses in the past, AA states that this is the "first in which systemwide sales training will become a regular and continuing part of an agent's curriculum."

Course consists of 18 lessons, the first nine dealing primarily with sales/service techniques and the last nine covering application of these techniques to AA's product—air transportation. Training is carried on through meetings conducted by instructors. Course was written by Merv Howett, training analyst in the customer service department's training section.

PRESENTING THE FIRST PROPELLER-TURBINE AIRLINER

TO GO INTO SERVICE IN NORTH AMERICA...

THE TCA VISCOUNT

Designed by Vickers-Armstrongs
Powered by Rolls-Royce

TCA's introduction of propeller-turbine Viscount aircraft is a major step forward in North American commercial aviation. Already proved by more than 200 million passenger miles on European routes, the Viscount will go into TCA service early in 1955 on U.S.-Canada and Canadian inter-city routes.

The flight of the Vickers-built airliner is characterized by a remarkable lack of vibration and a very low noise level, thus increasing both passenger and crew comfort. Cruising speed: 320 m.p.h. with four Rolls-Royce "Dart", two stage axial flow turbines each developing 1,400 h.p.

Its exceptional economy and ease of operation, together with its established popularity amongst air travellers makes it a notable "double-first" in airline operation on this continent.

TRANS-CANADA AIR LINES

One of The World's Great Airlines

International Aviation

By Anthony Vandyk

"I PLEDGE myself to take heed of what is going on in Germany." That is the best New Year's resolution any aviation man in the international field can make. For Germany, the western part at any rate, is fast moving toward its former place as one of the aviation centers of Europe. The airline, Deutsche Lufthansa, now has its four Convair 340's based at Hamburg and by spring will have started to take delivery of its four Super Constellations.

To pave the way for commencement of international operations by Lufthansa, West German government officials have started negotiations for bilateral air agreements with nations which the airline plans to serve.

In the military field activity is no less great although it is being conducted under a civilian guise. The Luftwaffe has not been formally revived so there can be no uniformed personnel. But the skeleton of an air force staff exists and its members are in constant touch with the senior officers of the NATO staffs. It receives almost daily visits from representatives of aircraft manufacturers seeking to have their products selected for the revived Luftwaffe.

Luftwaffe planners are in close communication with companies which less than 10 years ago constituted one of the world's mightiest aircraft industries. In Western Germany today there are 26 aircraft plants available for use with a skilled labor force of 26,000 which is also available. Last month a group of top German aircraft specialists met to discuss how and when Germany can get back into the aircraft business.

One spokesman urged that Germany should put an all-out effort into certain specialized fields rather than try to compete in all areas. Another—Heinkel's jet specialist—urged that German industry concentrate on aircraft that are "ultra light, ultra fast, and ultra cheap." Perhaps the most significant remarks of all came from Dr. Ernest Heinkel himself, the man who convened the meeting. He said: "An independent German aircraft industry is no more possible. We can no longer develop large aircraft of our own. Instead we must collaborate with the western nations and see that our own companies cooperate instead of compete."

FIRST PHOTO of the Hawker Hunter fighter fitted with drop tanks.

Rolls-Royce Reveals Details On RB109 and Developed Dart

Rolls-Royce has disclosed preliminary information on its RB109 and developed Dart turboprops. The RB109 will develop 4000 shaft hp plus 1000 pounds thrust for take-off. It is due to go on the bench this month or February, but components and turbines for the engine are already running. Production deliveries will start in early 1958.

The RB109 is about 8 feet long and 3 feet in diameter. The twin-spool axial compressor is only about 24 inches in diameter, indicating high pressure ratio and high temperature. The rear end widens, showing large expansion through the turbines extracting a high proportion of exhaust energy.

A developed Dart has been running at 1850 hp for almost a year and the R-R program is to up the rating to at least 2000 hp. To date, Dart engines have accumulated 36,000 hours of development running (16,000 hours in the air and 20,000 hours on the bench). In airline service (in Viscounts) they have run for some 250,000 hours.

The Dart development of 1850 hp and beyond is being achieved by a series of modifications, notably addition of a third-stage turbine. Other changes include shrouded impellers, improved combustion chambers, and automatic fuel trim.

Rolls-Royce is currently modifying the design of the Dart's flame tubes to overcome distortions after long life. After hot-spot investigations (with temperature-indicating paints), cooling rings were fitted. These consist of a top-hat section annulus welded internally by its "crown." The flame tube is pierced with two rows of holes (about ⅛-inch diameter at ½-inch pitch), which allows secondary air to enter the case where it is deflected along the inside face.

Transport Briefs

Qantas Empire Airways has taken delivery of four DC-Canada Beavers for use in New Guinea . . . **British West Indian Airways** plans to fly Viscounts between Nassau and Miami starting in October . . . **KLM** will provide first-class passengers on New York services with fully reclining seats through the year at no additional cost . . . **Aero-Express Bayerischer Flugdienst** is a new German independent operator based at Riem airport, Munich. It represents British independent Eagle Aviation . . . U. S. Foreign Operations Administration assistance may be given to **TAE National Greek Airlines** which is suffering from financial difficulties . . . **Aerolineas Argentinas** has bought a Short Sandringham flying boat from **SAS**. Latter has taken delivery of two Fokker-built Saab Scandias, bringing its total Scandia fleet to eight planes . . . British independent **Aquila Airways** has bought three Short Solent flying boats from Tasman Empire Airways.

Military Briefs

Finland is reliably reported to have finally accepted a Soviet offer to supply six MiG-15 fighters for delivery very shortly. Finnish Air Force personnel will probably go to the Soviet Union for training (under an earlier Soviet proposal Russian personnel would have come to Finland as instructors) . . . **Norway** is to receive 15 Piper Super Cubs for artillery spotting under the MDAP program . . . **Uruguayan** Air Force has ordered 10 DH Chipmunk trainers while the **Syrian** Air Force has ordered 15 more (bringing its total number of Chipmunks to 30) . . . **Japan** is scheduled to take delivery of a number of Lockheed P2V Neptunes this year . . . **South African** Air Force will soon get its first Avro Shackleton patrol bomber.

Manufacturing Briefs

Bristol Orpheus jet, primarily intended for lightweight fighter application, is due to go on the test bench very soon . . . **Westland Aircraft** plans to build the Sikorsky S-56 in England. British version will be known as the Westminster . . . **Short** Seamew patrol aircraft has completed its development trials for carrier-based operation and is now being assessed for other, land-based roles . . . Bomber version of the **SNCA du Sud-Ouest Vautour** made its first flight last month. It is the third Vautour prototyype to fly . . . U. S. price for the **DH Heron** executive plane is $186,500 . . . Sweden's **Saab** is to build a new series of Safir lightplanes—the three-seat 91B trainer version and the four-place 91C personal aircraft . . . **de Havilland** reports that its Avon-powered DH 110 all-weather fighter "has achieved outstanding attack dive speeds, well above the speed of sound." Company hopes that the Royal Navy will have the model ordered into production.

Western Europe's Watchdog Against Sneak Atom Attack

Powered by the Javelin is ful fighters ir vice ceiling and an ext climb.
Its produ and first c rons are c
Deliver ers to N ing pl

Pearl Harbour was a good lesson for all of us. We doubt that the next war will start with weeks and months of diplomatic tea parties. The chances are that it will come like sudden death. And, if you were the enemy, with all the chips down, a sneak attack on London would seem like a pretty good opening tactic.

Defence against this sneak attack is not an easy job. Certainly an early warning radar network in Europe is vital, but even single high-flying, high speed atomic bombers can wreak immediate destruction. And if, and when they try, the prime defensive weapon is the Gloster Javelin. Here is an aircraft second to none in the world. It flies and fights at altitudes higher than ever before. It has a destructive power tough enough for any bomber, but the most important thing of all is that it carries in it the most complex search radar gear, a British invention, which is unparalleled in any other aircraft.

Fair weather or foul, night or day, the Javelin can track down and engage in combat any bomber. The Javelin carries a two-man crew – one to fly the aeroplane and the other to operate the complex radar gear.

Very little can be said about the delta-wing Javelin because Security prevents it, but airmen know it for what it is – the most important aircraft in Western Europe. It is powered by twin Armstrong Siddeley Sapphires and is made by Gloster, who made the first successful jet aircraft and comes from the Hawker Siddeley Group, makers also of the Hawker Hunter intercepter and the Avro Vulcan four-jet Delta bomber.

DAY AND NIGHT ALL WEATHER FIGHTER

Gloster Javelin

GLOSTER AIRCRAFT CO. LTD., GLOUCESTER, ENGLAND. *Member of the Hawker Siddeley Group/Pioneer ...and World Leader in Aviation*

EN ROUTE . . .

WAYNE W. PARRISH

Just 133 red pins still on the map

EVER START SOMETHING you couldn't finish? Maybe I'm in such a fix right now. One of my hobbies is to land on or take off from every airport in the U.S. served by a scheduled airline.

As of the end of 1954 I've still got 133 to hit out of the more than 500 in the country and it's getting tougher every year.

Every time I think I'm making progress the CAB awards some new stops. I feel as though I'm on a treadmill. If the CAB and the airlines would just take a breather for a year maybe I'd get that total down.

My hobby is turning into a monstrosity. I've had to set up an intricate card index system with all sorts of colored cards and cross-indexing. I have to keep checking the red pins on the Texaco airline route map in my office and double-checking the city index of the *Official Airline Guide*. You'd be surprised how many airports go into and out of service during a single year.

I am still adhering rigidly to the rules I set up some years ago. Private flying, military trips, charter, and other special trips don't count. Just seeing an airport from the air doesn't count either.

Weather is my worst enemy

Weather has become my worst single enemy. I may hit seven airports on a local line and the eighth will be passed over. Or a local carrier will pass over a flagstop when there's no mail or passengers on or off so I have to wait for another trip to make the stop.

But I'm gradually reducing the total and seeing a lot of good people and fine country.

For example, I was going to the business aircraft convention in Dallas in October. Took me over 24 hours to get there but I knocked off a whole wad of new stops on Trans-Texas. I flew on American to Memphis one afternoon and was met by Drennen Albrecht, the airport manager there, who had arranged a fine steak dinner at the Normandy restaurant near the airport with Preston Oliver of American, Mel Foster of Capital, Sam Ashmore of Trans-Texas, and Scott Davison of Delta-C&S, plus Mrs. Albrecht who was celebrating her birthday.

I spent the night in Albrecht's house, which is at the end of the north-south runway, and I thought the first couple of airplanes that took off after I'd turned in were flying right through the room. Seemed no time at all until Drennen woke me up at 5 a.m. so I could grab a bite to eat and take TTA's local at 6:15 a.m. Four airplanes and 10 hours later I got to Dallas which is only 1 hour and 38 minutes away by American non-stop.

Nine new stops

It worked this way. The first plane went to Pine Bluff, Ark. I transferred there to another TTA plane bound for Camden, El Dorado, Magnolia, and Shreveport. I changed planes there to get to Marshall and Tyler where I had a three or four hour layover to wait for the next TTA plane bound for Dallas. One of my TTA pilots was Capt. Ted Foulk, who had flown me from Eagle Pass to El Paso back in 1948 when TTA was just getting started. The Shreveport, La., airport terminal, incidentally, is one of the finest in its class I've seen. Total new airports that day: five.

A few days later I boarded TTA at Dallas to go to Fort Worth, Brownwood, Brady, Kerrville, San Antonio, Beeville, and Corpus Christi—four new stops. Except that TTA passed over Beeville (a flagstop) and I cussed myself (and TTA) because I could have bought a ticket for Beeville and TTA would have had to stop. As it is now, a red pin still remains in that South Texas area and I'm not likely to get back there soon, Beeville not being exactly a mecca for my activities.

I got back to Forth Worth from Corpus on Braniff and spent the night so I could join Keith Kahle, president of Central Airlines, on a flight up to Oklahoma City next morning. I hit two new stops on Central, Duncan and Chickasha, and was made honorary assistant airport manager at Duncan and Lawton. There was quite a big ceremony at Duncan. I've got my certificates hanging on my office wall. But I can't figure out, as long as my title was honorary, why I had to be *assistant* manager instead of honorary manager. A lot of fun, anyway. From Oke City we flew to Wichita in one of Phillips Petroleum's Lodestars for the big airport dedication up there with no less than Billy Parker as the pilot.

Seven stops in four hours

From Wichita I took what seemed to be one of the longest hops on record to St. Louis on Ozark's new route. Seven stops in four hours. Ozark did quite a business. There were 27 seats in the DC-3, and a total of 30 passengers were carried one time or another, which is pretty good turnover. The stewardess was Delores Lark and one of the very best I've ever seen anywhere—also mighty good looking. The captain was R. W. Pontius, who had flown me on Southwest Airways from San Francisco to Medford, Ore., a number of years ago. This Ozark route, incidentally, stops at Chanute, Pittsburg, Joplin, Springfield, Jefferson City, and Columbia.

So you get an idea of the chore I've undertaken to hit every airline stop in the country. Early in the fall I took in Keene, N. H., on Northeast, and a little later I knocked off Asbury Park, N. J., and Salisbury, Md., on Allegheny. But we passed over Easton, Md., because the hurricane had knocked out the airport lights.

I have seven states complete as of now: Vermont, Connecticut, New Jersey, Virginia, Tennessee, Colorado, and my home state of Illinois. But there is one state—Maine—in which I've never flown at all and which has 10 airports served by Northeast. There are still seven airports to go in Texas and six each in California, New York, Minnesota, and Michigan.

There are eight states with just one airport to go and maybe you can give me some ideas on how to wipe 'em up without (1) wrecking my constitution, (2) spending a fortune, and (3) hitting them on the way to someplace. Here they are: Wyoming (Jackson Hole, seasonal only), Maryland (Easton), Missouri (St. Joseph), Nevada (Elko, one of the earliest scheduled airline stops in the country), Nebraska (Lincoln), South Carolina (Myrtle Beach, seasonal only), Rhode Island (Pawtucket), and Oregon (Roseberg).

Cross-Country in 62 hours

I owe a thanks to Rick White, district sales manager for Frontier Airlines at Billings, Mont., for going to a lot of work to figure out how I could fly from New York to Los Angeles entirely by local carriers and still beat the best train time. It's an intricate routing starting out with Allegheny and Lake Central, connecting in Chicago with Ozark, then to Central, Pioneer, Frontier, and Bonanza—44 stops in 61 hours and 45 minutes, as against the best train time of 62 hours and 30 minutes. There are two overnight stops at St. Louis and Albuquerque, in case you want to try it. As for me, no thanks. That DC-7 nonstop schedule looks awfully appealing.

Incidentally, my air mileage for 1954 (scheduled airlines only) came to a disappointing 67,278 miles, and my grand accumulated total, every bit of it according to official CAB point-to-point records, is now at 785,914. That first million is the toughest.

A. M. (Tex) Johnston (right), Chief of Flight Test, and R. L. Loesch, Senior Test Pilot, check the "707" before a test flight.

Boeing's jet transport is off to a good start

Day by day a big jet airplane is writing history in the sky over Seattle. The Boeing Stratotanker-Stratoliner has exceeded practically every expectation of its designers.

In the week following its first take-off, the 707 flew on six of seven consecutive days. By early October it had completed the entire first phase of flight tests, and today is far ahead of schedule. It handles well in the air, and fuel consumption has proved surprisingly low. Impressed by its performance, the Air Force has ordered a tanker version of the prototype airplane into production.

What lies behind the early success of this revolutionary transport? One factor is Boeing's unparalleled experience in designing and building multi-jet aircraft. Another is exhaustive research in the company's own trans-sonic wind tunnel, to achieve efficient airfoil and wing characteristics. And a third is sound production skill. The 707 incorporates many thoroughly tested features from other Boeing jet aircraft. For example, pod suspension of engines increases both safety and ease of maintenance.

The Stratotanker-Stratoliner inherits aerodynamic principles proved in more than a thousand Boeing six-jet B-47 bombers and in the eight-jet B-52 which now is in quantity production to become America's front-line heavy-bombardment weapon.

In addition, in the period since World War II, Boeing has produced more than 600 military C-97s and 56 commercial Stratocruisers. The C-97s perform almost all the aerial refueling operations of the U. S. Air Force. They also serve as high-priority personnel and cargo transports. The Stratocruisers are the acknowledged queens of transocean passenger service.

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Circle No. 50 on Reader Service Card.

SCREW-LOCK INSERTS. Heli-Coil Corp. describes the use of its new screw-lock inserts in Bulletin 715A.
Circle No. 51 on Reader Service Card.

THERMOSTATS. Hermetically sealed and semi-enclosed Type A thermostats for aircraft and electronic applications are listed in Bulletin L-9070A by Stevens Manufacturing Co., Inc.
Circle No. 52 on Reader Service Card.

SPLIT BEARINGS. Catalog No. 54 published by the Split Ballbearing Corp. contains technical data on its complete bearing line.
Circle No. 53 on Reader Service Card.

TEST CABINETS. 4-page brochure available from Trop-Arctic Temperature Products describes three new temperature cabinets with ranges from —200°F to +300°F.
Circle No. 54 on Reader Service Card.

DIE CASTINGS. Folder entitled "Intricate, Small Die Castings" is available from Page & Hall Manufacturing Co., Inc.
Circle No. 55 on Reader Service Card.

ELECTRONIC FACILITIES. A new 22-page brochure describes facilities and equipment produced by Servo Corporation of America.
Circle No. 56 on Reader Service Card.

LITTON INDUSTRIES. Activities of Litton Industries, Inc. in development of precision electronic components and specialized systems are illustrated in new 20-page booklet.
Circle No. 57 on Reader Service Card.

AIRCRAFT FORGINGS. A 20-page brochure discusses production of quality forgings to customer specifications. Consolidated Industries, Inc.
Circle No. 58 on Reader Service Card.

STAINLESS TUBING. New 6-page folder on seamless or welded stainless mechanical tubing is available from The Babcock & Wilcox Co.
Circle No. 59 on Reader Service Card.

DIGITAL INSTRUMENTS. Brochure published by Brush Electronics Co. describes its line of instruments for automatic counting, recording and control.
Circle No. 60 on Reader Service Card.

INSULATED TERMINALS. Complete series of insulated terminals and splices produced by Burndy Engineering Co., Inc. are listed in Bulletin YAE54.
Circle No. 61 on Reader Service Card.

COMMUNICATIONS. New 16-page booklet available from TelAutograph Corp. illustrates and analyzes manufacturing plant communications problems.
Circle No. 62 on Reader Service Card.

TEMPLATOOLING. Template Reproduction and Engineering Co. has prepared a 16-page brochure on use of its Templatooling.
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HYDRAULICS-PNEUMATICS. An 8-page booklet lists the services of Com-Air Products, Inc. in designing and producing aircraft hydraulic and pneumatic equipment.
Circle No. 64 on Reader Service Card.

TOOL GRINDING. "V40 for Tool Room Grinding" is the title of a new folder issued by The Carborundum Co.
Circle No. 65 on Reader Service Card.

SERVOMECHANISM DESIGN. New concepts in design and analysis of servomechanisms are discussed in Cook Electric Co.'s "Cook Technical Review," Volume I. Limited free distribution.
Circle No. 66 on Reader Service Card.

TIMING INSTRUMENTS. M. Ducommun Co. has published a new 12-page catalog of Minerva precision timing instruments.
Circle No. 67 on Reader Service Card.

VALVE CHARTS. A series of valve selection charts for aircraft and guided missile applications is available from Futurecraft Corp.
Circle No. 68 on Reader Service Card.

MINIATURE RELAY. General Electric Co. Bulletin GEA-6213 gives performance specifications on a new hermetically sealed miniature aircraft relay.
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DC-3 MODIFICATION. New folder available from Grand Central Aircraft Co. illustrates its DC-3 "Skyrama" executive aircraft interior.
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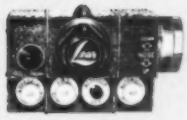

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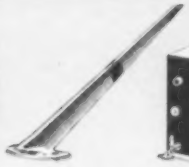

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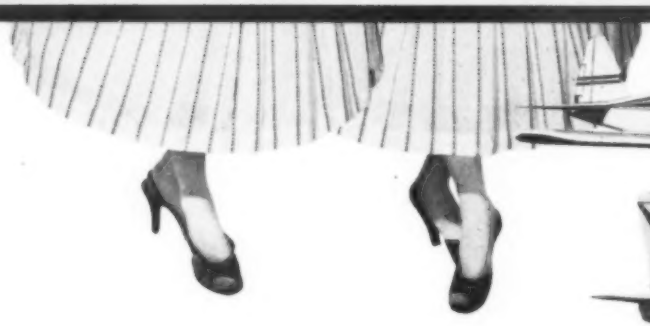

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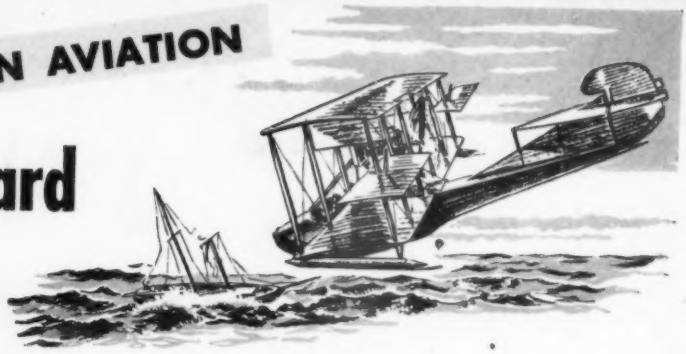
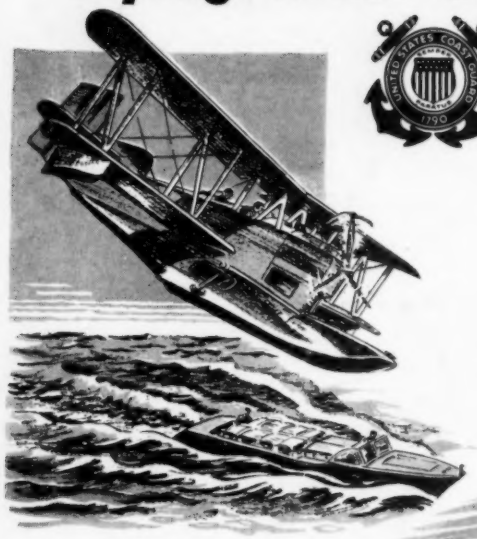
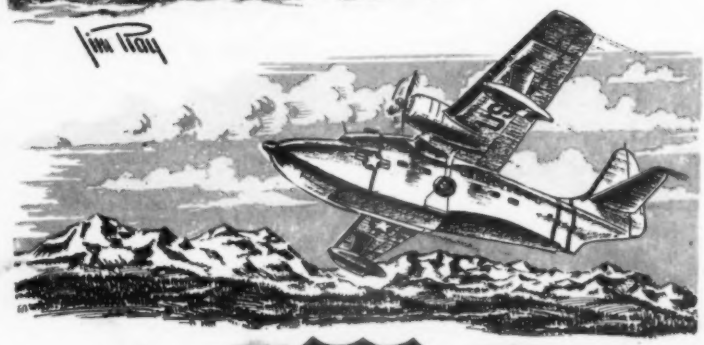
Flying Coast Guard





In 1915 three officers of the U. S. Coast Guard, using an airplane borrowed from the Navy, proved the value of aviation in searching for lost and disabled vessels along the Atlantic Coast. In 1916 Congress authorized the Treasury Department to establish ten Coast Guard Air Stations along our coasts, but it was many years before such authorization was carried out. Meanwhile, however, the idea was kept alive by the efforts of a few air-minded Coast Guardsmen using obsolete planes borrowed from the Navy.

In the late Twenties, the bold activities of smugglers and rum runners brought a sizable appropriation for planes and Coast Guard Air Stations. Since that time, U. S. Coast Guard Aviation has proved of invaluable service in war and peace from the Tropics to the Arctic.



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